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CITY 1
DIRECTOR'S
MANUAL



CITY GAMES



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CITY I

DIRECTOR'S MANUAL

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National Bureau of Standards
Washington, D. C. 20234

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Final Report

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I. INTRODUCTION

City I is an operational simulation game in which participants make economic, government and social decisions affecting a hypothetical metropolitan area. Through the use of a computer, the simulated urban system responds to the participants' decisions as any real city would. Each player in CITY I is assigned to a team which shares an economic and governmental role. The interrelated decisions made by teams will guide the way the simulated city changes in composition and size.

The simulation approach to cities offers the players an opportunity not only to make decisions but to implement them as well. They receive a feedback from their actions and see the effects from other forces that are constantly at work altering the effectiveness of the players' decisions. Players therefore have a learning experience in how to deal with a changing environment. The round-by-round play gives the players the necessary experience in selecting the type of analysis to move them towards their objectives while the allocation of their time and Game resources is a critical determinant of the success they hope to achieve. As the Game progresses, players learn to increase their involvement in the management of the environment while at the same time learning more about the relationships between business and society.

One of the primary purposes of the Game is to improve the players understanding of urban problems in systemic terms. In other words, the aim is to encourage players to view the activities of the City as being closely related and interdependent (e.g., an unemployment problem will exacerbate a health problem, the loss of industry and jobs in the private sector will reduce the number and quality of services offered in the public sector through reduced tax revenues, etc.). The Game also encourages players to use an interdisciplinary perspective when dealing with urban problems; that is, to look at the problem not only from the viewpoint of an economist, but also from the perspective of a geographer, planner, political scientist, etc.. For instance, if a player is dealing with a land use problem such as zoning, he soon realizes that he cannot escape the broader concepts of land-use planning. The problems of housing, unemployment, education, health, highways, etc., are all related in a system of interconnected activities and institutions to his original land-use problem of zoning. Hence, many of the outputs of this particular gaming model (e.g., land use maps, economic indicator tables, etc.) are designed in such a fashion that the City can be viewed more easily as a single entity than as several separate and disparate parts.

Although no two games are ever identical, most games have common characteristics that are noteworthy. In a typical game, the economic decision makers can best be described as rather conservative and cautious players. This aversion to risk-taking is especially noticeable in the early rounds when players are uncertain as to the outcome of particular decisions. Economic decision makers generally do not have a game plan and most decisions in the early rounds are not made in a systematic fashion or developed in a coordinated manner. In later rounds, many decisions are made as the result of actions taken in earlier rounds. For example, an economic decision maker might build some housing units

for rental purposes and then find that they are underutilized. The decision maker might then consider building commercial or manufacturing establishments close by in order to induce more people to live in the underutilized housing units and build up a good supply of labor. Just as likely, the procedure would be reversed, and the emphasis would be on building housing units near a previously built manufacturing plant in order to maintain an adequate supply of labor close to the plant.

The economic decision makers usually make profits on their business operations, although losses on particular investments are not uncommon. It is a characteristic of economic decision makers that profit maximization is the primary motive for making decisions, subject, of course, to the twin constraints of risk-taking and uncertainty.

The public decision makers attempt to make a concerted effort to improve the welfare of the City, although the indicators used to measure economic progress do not clearly reflect the intensity of this effort. During the early rounds, a typical game plan is to obtain additional revenue to upgrade the school system and municipal services, while at the same time attempting to redistribute the tax burden to fall more heavily on the business community and to a lesser extent on the work force. Lower income residents generally receive a tax break through the reduction of the sales tax on goods and services while the tax on auto owners is raised in the hope that the use of public transportation will increase.

As in a real city, the public defect looms as an obstacle in the path of all social reforms. So it is with the City game. The public administrators must face the debt problem and solve it before money can be allocated in significant amounts to create the utopian society we all dream about. These administrative processes that implement social reforms require the integration of decision making through the various disciplines. As the game progresses, the conflict between the objectives of the public and private sectors becomes amplified. Both sectors begin to realize that they cannot perform their objectives independently and the learning process begins. As an example of this learning process, consider the micro-level analysis of shopping centers which are simulated by the "personal goods" and "personal service" industries. To perform this analysis, appraisals are required along with business and property analysis. Investment portfolio analysis is required to manage a variety of business enterprises and a portfolio of real estate resources. The constraints on the entrepreneur come from the public sector in terms of zoning restrictions, building permits, taxes, utilities, etc., which can prove very formidable. Hence, the public and private interests become interwoven and the Game provides a way of demonstrating decision-making in a society where there is a community of interest between the public and private sectors. The inefficiencies of independent decisions become expensive not only to the developers but to the community as a whole, so it becomes evident that it pays to have an improved analysis of the problems of managing the environment in order to achieve public objectives, whatever they may be.

The Player's manual is designed to be a reference manual for game players and cannot be read as a text book. This manual is one of a set comprised of a Director's Manual, Player's Manual, and Computer Operator's Manual. It is assumed that players will be given complete instructions in the rules for a particular game play by the Game Director who is experienced in running this particular game. Individual players will use only those portions of the manual that are applicable to their game goal. The Director's manual is also written as a reference manual. It contains all the computer commands necessary to change the simulated city for each round, computer printouts and a glossary of terms used in the game (see page 56).

In the playing of the actual game, participants assume various roles in the public and private sector as outlined in the player's manual. A Game Director who is familiar with the Game in detail begins the Game with a classroom type lecture devoted to the discussion of the major decision-roles in the City Model as well as the many printouts and reports that result from each player's decision inputs. During this session, players are assigned a particular role (i.e., economic decision maker, mayor, school board member, etc.) and asked to read that portion of the Player's Manual dealing with his role. Using the manual as a technical guide, the players address themselves to the mechanics of coding forms and interpreting the computer printouts. It is at this time that the Director describes the preprogrammed city in the computer to the players. The Director has the option of choosing initial parameters such as economic growth rates, social conditions, production capacities, etc. to suit the particular objects of the players and thereby making the Game more flexible and susceptible to innovative approaches to urban problem-solving. The Director can structure the role assignments to be directed at individuals who concentrate on single objectives such as heavy industry to multi-disciplinary task forces to consider urban problems within an interdisciplinary framework (e.g., a task force on transportation policy might include a sociologist, political scientist, geographer, planner, engineer and an economist).

With initial roles established, the game begins. The Director generally starts the game by discussing possible objectives with each player or group of players along with the present or initial city conditions. For example, if the Director chooses to use the planning-programming-budgeting systems approach, each player or group of players must:

1. Define his general Goal which is Output Oriented.
2. Identify objectives which indicate conditions or levels which must be obtained or maintained to successfully reach the designated Goal.
3. Draft Programs which are designed to achieve the standards set by the various objectives.

4. Evaluate the Programs to determine their effectiveness (in cost/benefit terms) as compared to alternative programs. Consider a political role in the urban system that is abstracted as follows:

Political Goal: School Department

Develop a school system comparable to the best in the nation, which will provide high quality, accessible and meaningful educational experience to the City's population.

Objective #1

Maintain the pupil/teacher ratio at less than 21/1.

Program #1

Using the population growth projections, determine future student levels. Hire middle and high income teachers, at the optimum mix, to meet this demand.

Program #2

Redistrict school boundaries to better utilize existing City resources.

Program #3

Construct new schools or add to existing facilities as projected. (Specific round-by-round projections are used.)

Objective #2

Keep unmet demand for adult education at less than 10% of the total demand.

Program #1

Use the population growth projections, determine future student levels. Hire middle and high income teachers, at the optimum mix, to meet this demand.

It can be seen that the School Department has:

1. A definite goal (to be the best)
2. Identified meaningful standards of performance (student/teacher ratio of 21/1 and unmet demand for adults at 10% or less)
3. Determined approaches to achieve these standards (population projections, new construction, redistricting, etc.)

The previous example of the School Departments (see page 24) political goal could apply to most school systems in any City. We all want low student/teacher ratios and the best possible teachers for our children. New construction, better utilization of facilities and adult education programs with the most competent teachers available is certainly a laudable goal. The only obstacle to this utopian dream is that other government departments leave their dreams and all departments compete for the lion's share of limited tax dollars. Besides education, the government sector (see page 12) must consider the problems of budgeting, taxation, assessment and bonding (see page 23), highways (see page 25), fire and police protection (see page 25), planning and zoning (see page 24) utilities and bus and rail transportation (see page 23). Departments make decisions which include allocating capital and current funds, changing salaries and maintenance levels, requesting federal/state aid, changing district boundaries, constructing or demolishing public buildings and changing levels of service.

In the game, all of the above roles are inacted by various players who strive to optimize their goals just as in the example of the school department. Collectively, the Government players work from a tax base that is continually being attacked by the tax payers as excessive and yet their very employment is insured by the elective process which, of course, is determined by the same tax payers who are continually demanding more services from the government. The source of government revenue is taxes which are levied on the population just as in a real city. Other players must assume roles in the cities economic sector to create employment for the population. The activities of the businessmen must include the operation of the industrial, commercial, and residential establishments which in turn require land purchases and sales, salary changes, maintenance level alterations, business goods and services, purchases for operating exigencies, boycotts of commercial firms, acquisition of long and short term loans, and constructing, improving and demolishing businesses.

The commercial activities (see page 11) are subdivided within the game into Basic Industries, Construction Industries, Commercial Activities and Residences. The Basic Industry includes heavy and light industries and national services (including Standard SIC classes) which spend money for business goods and business services, utilities, a labor force, transportation and above all taxes. The Construction Industry (see page 33) builds and/or demolishes other developments and firms from outside of the local area may also perform construction work. Commercial activities spend money on many of the same items as the basic industry in order to maintain a level of service capacity. This service capacity is available to serve local customers. Finally, the residences, (single-family, townhouse, and highrise) spend money on goods and services, utilities, taxes and earn income based on rent charged and the number and type of occupants residing in their housing units (see page 49).

The City model selected for game play may be a typical city or it may be the player's own city. The model employs a grid board (see page 12) geographical map that can be loaded with data from any regional or metropolitan area. The map contains 625 parcels in which each parcel represents one square mile of land. Many of these land parcels are unowned at the beginning of play and those that are occupied are represented by a specific, representative land use. For instance if a square mile consists mainly of middle income residences, this parcel would be designated as such even though there could be a few commercial businesses within the square mile. The only requirement to assigning parcels is that the assignment typify the most representative land use. In a similar manner highways and roads are represented along the boundaries of the parcels. If you imagine a parcel as represented by a square, then a road is described as one or more sides of the square.

Once the representations are made, there remains the task of determining the zoning classifications (see page 17), the cash available to each player or team, salaries, city financial resources, department expenditures, tax base estimates, road configurations and utilities and terminals (see page 17). These inputs along with the parcel classifications describe the starting city. The files of this starting city are stored in the computer and can be altered by the game director to suit the players needs (see Director's Manual). Changes in these files may affect the output of the computer but will have no bearing on how the computer calculates the output. The computer program directs the computer to act upon the data files in fixed relationships using the various data stored in the city file. In this way the computer can respond to updated file changes, act as an outside system, perform routine functions or processes that would be time consuming for the players and finally act as a bookkeeper (see Computer Operator's Manual).

The starting City, as just described, is designed by the Director in advance of game play. It is up to the Director to inform the players about the details of the particular game play which is usually accomplished by a brief talk (30 - 45 minutes) prior to the actual start of the game. Perhaps the most important contribution the Game Director can make is by controlling the flow of play. Timing and supervision are the key ingredients to a successful game play. In short, a Game Director requires three elements for success in running City I:

1. A thorough knowledge of the material
2. An innate sense of timing
3. The desire and motivation to creatively manage an innovative learning experience.

At this point the game is ready to be played. Each player studies his printout generated from the starting city to evaluate his status as an individual and as a team member. Each team defines its specific problems, establishes objectives and develops strategies. Various groups will then gather for informal sessions for the purposes of bargaining, trade-offs and consummating deals. Eventually each group arrives at final decisions for

actions to be taken in that particular round of the game. These decisions are then entered into the computer by a special code and the model is ready to run. The computer then prints out a new series of data representing the changed city.

In a typical game play the players generally behave in a predictable way with a minimum of player interaction early in the game. Players tend to feel that most interrelations should be avoided for the sake of secrecy. Most players use the guise of ignorance when talking to their peers early in the game and their contacts are limited to attempts at acquiring knowledge. As the player's command over the technical content increases, so does his awareness of the necessity for a properly functioning system. The player realizes that his economic aspirations will not be achieved unless his public counterpart can create a suitable "service-rich" environment in which he can operate. Typically, one or two players generally emerge quickly with an extensive grasp of the system and its technical content and assume the role of educator. In a fashion similar to the old ward politicians, the educators disperse favors (the patronage in the form of technical explanations), to gain the initial respect of his constituents. Needless to say, it is then a simple matter for the educator to insure his election to the mayoralty of the City.

As time passes, other players come to understand their role and the role of others and begin to realize that the mayor, although helping the city to function, often is insuring his own economic prominence at their expense. At this point, the era of the ward politician is inevitably (or generally) over and with this passing comes the emergence of the city-manager. The political cooperation that grows from the new regime eventually leads to a full appreciation of the efforts of others and will open up higher levels of discussion concerning city-wide urban problems. Although the previous discussion concerns player behavior during game play, the influence of the gaming process has created a learning experience for the players. This learning experience is one of the fundamental purposes of City Games and these experiences with the game can be transferred to the problems of the real city.

In most games, the Game Director's role diminishes as the play progresses and players become more familiar with the technical content of the game. Since bribes and boycotting are allowed along with collusion and other forms of special interest groups, a new aspect of the game appears, namely law and order. Players rapidly learn that disputes cannot be settled by opposing interest groups and the enforcement of agreements and compromises becomes almost impossible. Players demand legal systems and police departments and the local government is faced with new expenses to deal with. If these demands are met, the City managers must generate more income to meet these expenses and forego other spending plans. At this point, the hypothetical city is becoming very real and very complicated to run. Even though it is a hypothetical city, players become emotionally involved and the intensity of their involvement permeates the playing area. Time is a constant enemy for the players just as in real life. Everyone wants everything at

once and a typical game play allows the players about two to three hours per round to make their decisions. One round of the game is equivalent to one year of real time. If elections are required every two years, only two rounds are played before new elections. If the newly elected officials fail to honor prior commitments by their predecessors, well, the best laid plans!

It is within this framework that the City I manuals are written. There are three manuals for City I; a Director's Manual, a Players' Manual, and an Operator's Manual. The Director's manual is designed to explain the technical content of the computer program including term definitions, programming change procedure and the numerous technical details associated with the game. It is assumed that the Game Director has been taught the gaming operations prior to assuming the Director's role and will use the manual as his primary reference source rather than a set of instructions for running the game. The manual further assumes that a Director has had training in Fortran programming and understands formatting and coding in addition to being knowledgeable about Urban problems. The Director designs the initial city conditions for the start of a game. The manual provides initial conditions for a typical city and specific computer commands for altering these conditions.

The Players' manual is also designed to be a reference manual and not a text book. The complexity of the game requires extensive reading on the players part prior to the start of a game or selective reference material which is coordinated with the Director's introductory lectures and possibly monitors who are trained in the gaming procedures and will coach the individual players when required. This latter approach has proven to be the most effective method of training players. If past games are indicative, individuals seem to learn their roles much faster when coached by a monitor during actual playing conditions as opposed to concentrated reading and memorizing prior to the start of a game. It is not presumed that players have prior knowledge of this game or even simulation in general. The game is designed so that players do not need to know computer programming or how to operate the computer. These functions lie with the Director and the Computer operator.

The Operator's manual is written for an IBM 1131 and presumes that the operator knows how to cold start the computer and mount the tapes. This manual explains the relationship between the programming data, the taped program and the operation of the computer. Test sequences are given along with a detailed explanation of switch control and error messages. It is not required for the operator to understand the Director's or Players' role but only to be knowledgeable in operating the computer.

In general, the game should be played with at least 25 players utilizing a large room where players can move freely about. Computer printouts are usually taped on walls for easy access by all players. An optional display would be a gaming board for visual display of the city. The board is marked off in grids to conform to the City map and plastic playing pieces are used to represent the various types of buildings. Colored tape

is used to mark off highways and boundaries. Human interest is added if one player agrees to become the Big City News editor. The idea is to subtly report on the good and bad features of the game play in a humorous way. The Game Director reports the results of each round to the news editor who proceeds to write his paper and distribute it before the players learn the results of the round. The detailed computer outputs are then distributed to the players so that they may learn how well their particular game plan went. In other words, the paper presents the overview and the computer reports on the specifics. This method allows the Game Director to concentrate his time on selected areas rather than all areas at the end of each round.

In addition to the normal problems of the City, the Gaming Model can be used for more sophisticated analysis. The Economic Base can be investigated to determine the causes of a changing growth rate along with identifying the components of the economic base. Business cycles can be explored since they are dependent upon sales of goods and services outside the local economy and must be supplemented by an analysis of the condition of the National economy. This provides a useful yardstick for measuring economic performance. By charting the prices for basic industry output, the return on investments and the interest rate on loans and bonds, the players can determine which phase of the business cycle they are in which in turn, would partially explain capital investment attitudes.

Other basic studies important to public and private decision-makers concern the tracing of population growth and projecting future levels. Trends in employment (total), employment distribution by industry, unemployment rates and income distribution are available and in a usable form in the Cities output. Here again a PPBS format would guide the player in assembling the pertinent facts and disregard peripheral information.

Housing market analysis becomes important in any geographic area where dwelling units are in competition with one another as alternatives for the users of housing. This problem incorporates many of the previously mentioned types of analysis: economic base, employment trends, income distribution and population analysis along with the additional component of housing stock or inventory. The magnitude of the total housing stock in terms of dwelling units, reflecting changes overtime, is one of the most significant indicators of city growth coupled with a changing distribution of the inventory by structural type. Equipped with this knowledge plus an awareness of vacancy rates, rents, property values and financial market conditions, the private developer could make a rational decision as to the advisability of a housing investment.

Appraisal theory can be utilized to aid prospective purchasers and sellers as to the market value of particular parcels of land. The data needed to apply to the cost, income and marketing approaches to appraisal theory is available on the various output sheets supplied by the game.

The above are only examples of types of game play because each time a game is played, it is structured to meet the needs of the particular group of players.

II. MODEL PROCESSES

A. The Computer

The computer performs several major functions in City I. First, it stores all the relevant statistics for the area; updates data when changes are made, and prints out yearly reports. Second, the computer acts as an Outside System, simulating decision-makers, influences and markets that are outside the local metropolitan area. For example, the computer simulates the National Economy business cycle which determines interest rates on most loans, determines the income of basic industries, and is the source of required goods and services when the local system is unable to supply them. Third, the computer performs certain routine functions or processes that would be time consuming if the players themselves were to perform them. For example, the computer assigns workers to jobs under the assumption that workers will attempt to earn as much money as possible. Other processes include assessing all property, assigning buyers of goods and services to shop at particular commercial establishments, and assigning children to public or private schools based upon the capacity and quality of the public schools.

Finally, the computer acts as a bookkeeper. It records all the transactions of players, deducts their expenditures and adds their incomes to their financial accounts.

The computer does not have a large vocabulary. Thus, players must write their decisions or questions in a language developed specifically for the computer. This language is an abbreviated code which the computer can understand. For example, when economic team A wants to change a salary, it will write \$CS followed by the necessary information, instead of the entire work. In order to send information to the computer, a player must fill in certain blanks on the input decision form.

B. The Two Sectors

City I contains two basic decision-making sectors: economic and governmental. Every city contains these two vital sectors whose interactions cause the city to either grow and prosper or stagnate and decay. Decisions made by one group ultimately affect others and one group often works against another group to achieve its goals.

1. The Economic Sector

The economic sector of City I is that activity which gives any city one of the basic reasons for existence. Economic decision-makers are those businessmen who operate industrial, commercial, and residential establishments. Upon receiving output at the beginning of the round, economic decision-makers review their economic status and make decisions for the present round. The various economic activities of City I include bidding

on unowned land or attempting to acquire land from local or outside sources; applying for zoning changes; requesting utility expansions; requesting increased highway access and making general business decisions to increase the overall profitability of their firms.

2. The Government Sector

In City I the government sector deals with the problems of education, fire and police protection, planning and zoning, utilities, highways and overall coordination. The government sector is divided into two basic components. The first component includes elected officials: the Chairman and Council. The officials are elected by all teams representing the people who live in each jurisdiction. The Chairman and Council set tax rates, approve budgets, grant subsidies and appropriations, and make appointments. Appointed officials named by the Chairman are heads of five government departments: Finance, Schools, Public Works and Safety, Highways, and Planning and Zoning. Players representing these departments make decisions which include allocating capital and current funds, balancing budgets, changing salaries and renovating, constructing or demolishing public land uses, changing levels of utility service, and transferring cash between accounts.

C. The Game Board

The City I metropolitan area is represented on a game board consisting of 625 squares (25 x 25). Each square represents one square mile of land. Many of these land parcels are unowned parcels at the beginning of play. Unowned parcels may be purchased and developed by decision-makers during the course of the game. As players continue to play City I over the course of several rounds, the physical changes inherent to all cities will be visible on the playing board.

The game board and all computer maps are keyed to a coordinate system of even numbers. Each square mile parcel can be identified by its coordinates. Horizontal coordinates range from 70 to 118 and vertical coordinates range from 12 to 60. Intersections are identified by odd-numbered coordinates and highways are identified by even-odd (east-west) or odd-even (north-south) coordinates. In all cases, the horizontal coordinate (i.e., the large number) is identified first.

For example, in the map below the shaded parcel is identified as 7014. Further, the four mile highway indicated by ZZZ is identified as 7217, 7417, 7617, and 7817, while the two mile highway indicated by XXX is identified as 7318, 7320. The intersection marked ● is located at 7317.

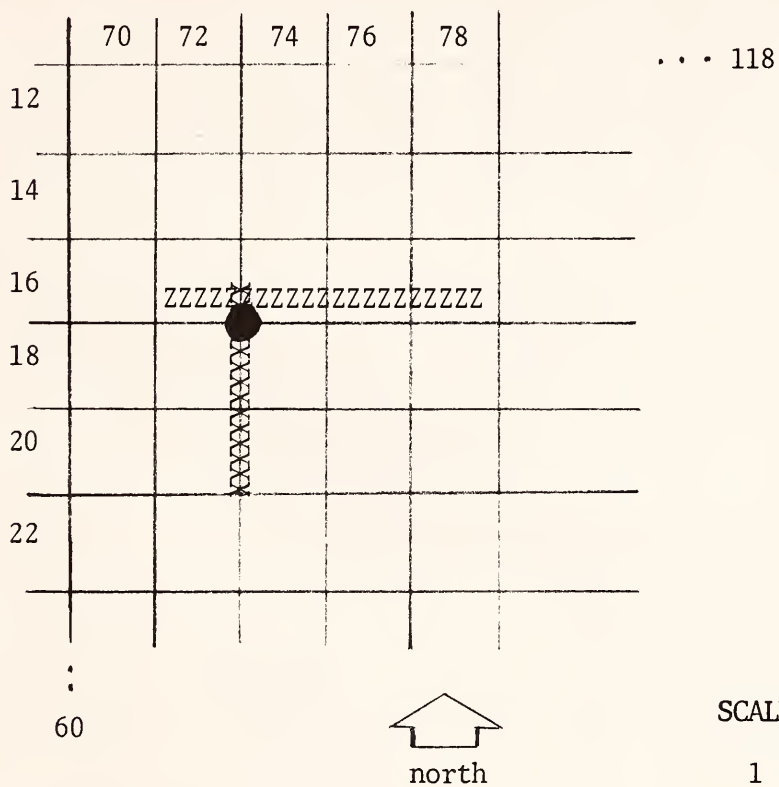
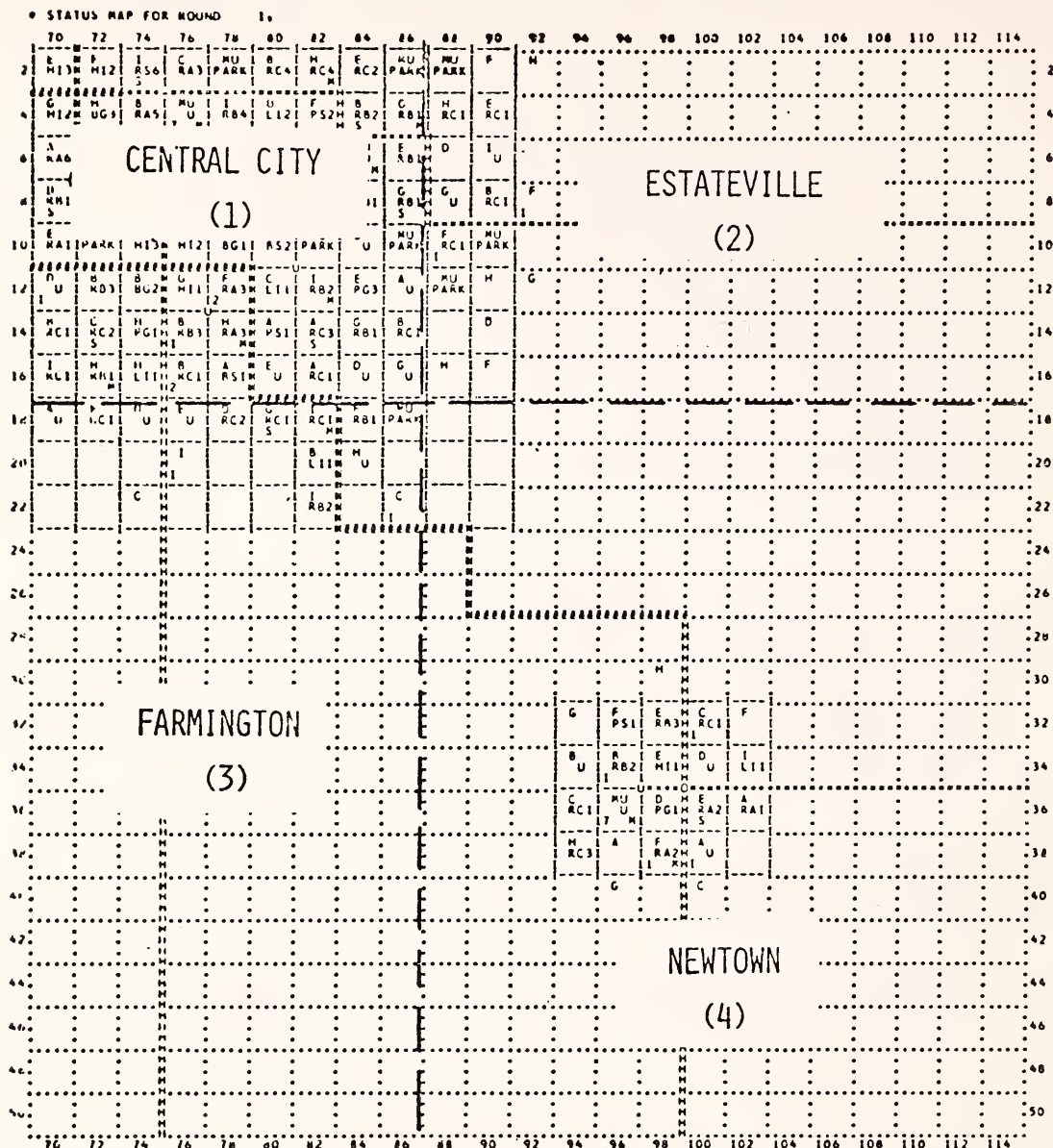


Figure I-A shows the simulated county of four separate areas: Central City, Estateville, Farmington, and Newtown and indicates the location and jurisdiction code (1-4) of these areas.



PARCEL INFORMATION CODE

TOP LINE: ECONOMIC OWNER (A THRU I)

OR MUNICIPAL (MU)

MIDDLE LINE: PRIVATE LAND USE AND LEVEL, PARK,
OR PRESENCE OF UTILITY SERVICE (U)

HI = HEAVY INDUSTRY
LI = LIGHT INDUSTRY
BG = BUSINESS GOODS
BS = BUSINESS SERVICES
PG = PERSONAL GOODS
PS = PERSONAL SERVICES
RS = SLUM RESIDENCES
RA = LOW-INCOME RESIDENCES
RB = MIDDLE-INCOME RESIDENCES
RC = HIGH-INCOME RESIDENCES

BOTTOM LINE: LEFT SIDE: UNITS OF PARK (MAXIMUM IS 7)

MIDDLE: SCHOOL(S)

RIGHT SIDE: MUNICIPAL SERVICE UNIT (M)

ROAD INFORMATION

M OR Z - TYPE 1

H OR - - TYPE 2

I OR - - TYPE 3

..... - ROADBED

TERMINAL INFORMATION

(AT INTERSECTIONS OF ROADS)

O TYPE I

X TYPE II

⊗ TYPE III

UTILITY PLANT

(AT INTERSECTIONS OF ROADS)

D. Levels of Aggregation and Scale

Since City I is a fairly complex model, it has been necessary for the designers to build in a level of aggregation in order to simplify calculations. For example, land is aggregated in square mile parcels, rather than acres or blocks. Furthermore, people are considered in groups of one thousand or more rather than as individuals.

In City I, all dollar figures are scaled down by a factor of 1,000. You will discover, for example, that whereas an RB1 supplies 1,000 middle income workers, the typical salary is \$5,000 per 1,000 workers. Hence, the typical income of an RB1 is \$5,000 rather than \$5,000 x 1,000 (workers) or \$5,000,000. Furthermore, the typical income for an HI1 (Heavy Industry) is \$70,000 per year rather than the more realistic number of \$70,000,000 per year.

Since this scale factor is constant however, it does nothing to affect the relationships in the City I model. On the contrary, it simplifies the calculations that must be performed by the players.

E. How to Begin Play of City I

At the beginning of play, participants should be divided into nine economic teams (A, B, X, S, W, D, G, G, I). These teams should then nominate and elect a Chairman and two Councilmen (1 from Central City and 1 from the suburbs, Estateville, Farmington and Newtown). Voting can be done either by a simple show of hand or by computing the voting power of each team in the Central City and the suburbs.

Once the Chairman has been elected, he should appoint teams to serve as his bureaucracy: Finance, Schools, Highways, Public Works and Safety, and the Planning and Zoning Departments. It is recommended that most teams have at least one governmental role in addition to its economic role (remember, there are nine economic roles and eight governmental roles).

After teams have been formed output can be distributed and participants can begin making decisions, filling in forms, and sending them to the computer.

F. The City I Round

In the City I game, a round represents a year of change in the life of the simulated area. From the standpoint of the participants, however, a round may be thought of as a decision-making cycle which starts when they receive output and ends when they feed their decisions to the computer.

During the early part of a typical round decision-makers will be simultaneously reviewing their computer output and attempting to organize their possible actions. Economic decision-makers for example, will probably bid on the various unowned parcels of land and attempt to acquire desirable land from other participants. They may attempt to secure loans from local or outside sources, apply for zoning changes, and request utility expansions and increased highway access.

Meanwhile, the governmental decision-makers may be receiving requests from the economic and social decision-makers to lower taxes, improve schools, provide better municipal services, expand highways, build additional utilities, enlarge the park system, and improve other services. Budget officials are faced with the task of finding additional revenue to meet expanding public needs and dividing appropriations among the many local departments, all of which have attempted to justify their expanding budgets.

Toward the middle of the round, it becomes clear to many decision-makers that all of their requests will not be granted. Thus, trade-offs and bargains must be made. Elected officials will begin to worry about staying in office. Departments must plan to operate with less funds than they had requested. Businessmen begin to look for short-cuts to reduce their losses and increase their activity and profit-making ventures.

As the round approaches a conclusion, the participants formalize the bargains they have made, continue to record their decisions for the computer, terminate the negotiations on new wage levels and new prices, and complete any other possible actions. When the round ends, participants campaign and carry out new elections, hold town meetings, debrief their actions, and develop new strategies while the computer is performing its functions and preparing new output on the status of City I.

G. Optional Citizen's and Mass Media Team

A game director can choose to include a Citizen's and Mass Media team in a City I play to reflect the dynamics of public opinion and public pressure in an urban system. The team could function as the news media, public interest group, citizen's pressure group (as against more highways), civic and neighborhood associations, and the like in any combination of those activities.

The team can be selected in several ways: as a separate team at the beginning of play, or comprised of representatives from other teams (to add a partisan or economically-based influence that usually characterizes such pressure groups), or in other ways that the game director may devise.

III. LOADING A NEW BOARD CONFIGURATION

If a different board configuration is desired, the new information can be input on data cards preceded by a //BXEQbLOAD card. Loading must be in the following order:

1. Zoning Classifications being used in the game
2. Parcel Cards
3. Team Cash Balances
4. MS and School Salaries
5. City Financial Resources
6. Department Expenditures
7. Tax Base Estimates
8. Road Configuration
9. Utilities and Terminals

Zoning Classifications

- col. 2 - maximum level BG-BS
4 - maximum level PG-PS
6 - maximum level LI
8 - maximum level HI
10 - minimum residential social class
12 - minimum level residential density
14 - maximum level residential density (use 7 to indicate R7 or R8)
20-21 - external zoning code, the two-digit number to be used for input purposes by players (a "-1" here indicates the end of the zoning table).

The Board

- col. 1-5 - parcel coordinates, right justified, larger coordinate first
6 - blank
7-15- team owning, left justified. If city owns entire parcel, owner is "MUNICIPAL."
16-17- two letter land use, left justified (R, LI, HI, BG, BS, PG, PS).
19- (if business) density (1, 2, or 3)
21- (if residence) social class (H, M, L or S)
34-35- value ratio (01-99)
38-40- assessed value of land in hundreds, right justified
41-42- zoning classification (external code)
43- utilities (1=present, 0=absent)
44- jurisdiction (1=Central City, 2=Estateville, 3=Farmington, 4= Newton)
49-50- (if business) salary paid low-income employees in hundreds
50- (if residence) density (1-8)
51-55- (if industry or BG) terminal location
55- (if residence) 1= municipal service unit on parcel
60- (if residence) 1=school unit on parcel

- col. 61-65- (if PG or PS) charge to low-income residence units in tens (right justified)
(if BG or BS) charge to LI1 in tens (right justified)
- 65- (if residence) park units on parcel
- 66-70- (if BG or BS) charge to HI1 in tens (right justified)
(if PG or PS) charge to RB1 in tens (right justified)
- 71-75- (if BG or BS) charge to PG1 in tens (right justified)
(if PG or PS) charge to RC1 in tens (right justified)
- 72-73- (if residence with MS) number low-income employees in hundreds, right justified.
- 74-75- (if residence with MS) number middle-income employees in hundreds, right justified
- 76-80- (if BS) charge to PS1 in tens (right justified)
- 77-78- (if residence with school) number middle-income employees in hundreds, right justified
- 79-80- (if residence with school) number high-income employees in hundreds, right justified.

A card with 9999 in columns 2-5 signifies the end of the board data and must follow the board load deck.

Team Cash (1 Card per team)

- col. 1-2 - team code number (01=A; 02=B; 03=C; 04=D; 05=E; 06=F; 07=G; 08=H; 09=I).
- A 99 here indicates termination of team cash input.

5-12- Team cash balance. A decimal point must be used at the end of the number.

MS and School Salaries (1 Card)

- col. 1-5 - salary to low-income MS employees, in hundreds (right justified)
- 6-10- salary to middle-income MS employees, in hundreds (right justified)
- 11-15- salary to middle-income teachers in hundreds (right justified)
- 16-20- salary to high-income teachers, in hundreds (right justified)

City Financial Resources (1 Card)

- col. 1-10- county cash balance, with decimal point.
- 14-15- income tax rate (in tenths of percents) right justified
- 19-20- sales tax rate, right justified
- 24-25- property tax rate, right justified

Department Expenditures (4 Cards)

Eight columns of 10, each number followed by a decimal point:

- 1) Public Works appropriations, expenditures for construction, renovation, land purchase, utility plant construction, utility line installation

- 2) School appropriations, expenditures for construction, renovation, land purchase
- 3) Highway appropriations, expenditures for upgrading, renovation, land purchase, terminal construction
- 4) Planning and Zoning appropriations, expenditures for land purchase, subsidies

Tax Base Estimates (1 Card)

- col. 1-10 - income tax base estimate (with decimal point)
11-20 - sales tax base estimate (with decimal point)
21-30 - property tax base estimate (with decimal point)

Road File

The load deck for roads consists of 26 cards, each containing information on 26 intersections. The information for each intersection is 2 digits, the first specifying the road type running north of the intersection and the second specifying the road type to the east. There is a single space between each 2-digit group. Begin in Column 1. A card with 99 in the first two columns signifies the end of the road file.

Utilities and Terminals

- col. 1-5 - location of intersection (right justified)
7 - U (for utility plant) or T (for terminal)
9 - (if terminal) Type

0000 in Column 1-4 indicates end of this load section.

To print a map of the new board without having to run through the entire output, load the above information, put switch 6 up, and type //bXEQbMAPA. When that finishes, type //bXEQbMAPB. A status map will print.

IV. ADMINISTERING A GAME-PLAY

A. The Game Room

The physical location at which a game is conducted can often condition the flow of the play. It is important to remember that a game is quite unlike a traditional class exercise and therefore the space requirements are substantially greater.

It is desirable to obtain a fairly large room within which several groups can caucus and yet retain a degree of privacy. It is also desirable to have several small private rooms for the use of the government and for complete privacy in bargaining and strategy sessions.

In any event, the government should have substantial privacy when it so desires. Either a completely separate room should be available for the government's use, or at least an isolated area in the general game room if that is possible.

B. The Computer

While the Game Director need not be intimately familiar with computer processing, it is nevertheless highly desirable that he be familiar with the hardware requirements necessary to run City I. The basic requirements of the IBM 1130 system include: 1) an 1131 control processor with at least 8K core and single disc storage; 2) a 1442 mod 6 or 7 card reader punch or 2501 card reader and 1442-5 card punch; and 3) a 1403 printer or 1132 printer.

Utilizing the 1403 printer, it will require approximately 30 minutes for output while the 1132 printer will utilize approximately one hour. The total time required for processing a round therefore, will vary from one to two hours depending on equipment used and the number of decisions made.

C. Game Materials

A minimum of supplies are necessary for a game and they should be in place and available before the start of the play. These supplies and materials include:

1. Adequate Player's Manuals
2. Decision Forms
3. Name Tags (showing both name and role)
4. Masking Tape (for posting output around the room)
5. Plastic Overlays and Grease Pencils (for display purposes)
6. Starting 1st round output

D. Pre-Game Planning

Serious thought must be addressed to scheduling matters. It must be understood that the first round is essentially an instructional session and, consequently, little of a substantial nature can be expected. Many players will even be hesitant to fully participate and make meaningful decisions in the second round, and hence a truly substantive exercise often cannot be achieved until round 3.

It is assumed that for campus use City I will be run once or twice a week. A round should take 2 to 4 hours depending upon several factors including size of the group and level of sophistication. It is unlikely, however, that a round can be adequately run in less than two hours. Three hours is the average time consumed for a single round of City I.

It is at the discretion of the Game Director to decide how many rounds will comprise a complete game. There is no scoring, nor is there a formal cut-off point in rounds. A game may include as many rounds as the Game Director finds useful. Rounds may be run once a week, several times a week, or consecutively within the space of several days. In any event, a minimum run of 4-5 rounds is usually necessary to achieve minimal goals.

E. Directing Play

The Game Director should remember that he is not a participant in the play and therefore should refrain from "helping" players make innovative decisions. Players will solicit advice and assistance, and this should be rendered in moderation. Players will learn their roles, develop strategies and derive benefit from participation by being forced to deal with the problems they encounter. By "solving" player problems, the Game Director perpetuates his role as teacher and actually retards the player's learning and development. In short, the Director should allow players to make and learn from their own mistakes and provide help only when necessary.

Following is a typical pattern for starting play:

1. Introduction - a brief talk (30-45 minutes) describing models, computer capability, the general design of City I, goals of play, reasons for lack of scoring, terminology used, concepts, etc.

2. Film - numerous films are available on the subject of urban affairs in general and on specific aspects of the general problems. A twenty minute film showing a game-play in operation was made in 1970 by WRC-TV (NBS-Washington). Copies of this film (The City That Never Was) may be purchased by writing to that station at 4001 Nebraska Avenue, N.W., Washington, D. C.

3. Getting Players Into Roles - There is no rapid method to allow players to digest the numerous facts and formats needed to be understood in order to play City I. Players simply must read the general information and the specific descriptions of their own roles.

4. The 1st Round - It will probably be necessary for the Game Director to circulate and speak with each player during the first round to insure that the role is at least generally understood. The Director should attempt to motivate each player to make at least one decision during this round. Players will be hesitant to make decisions claiming they are unsure, unclear, unwilling to make foolish decisions, etc.. The Director should forcefully encourage players to make a decision anyway just to get the game rolling and to get the feel of decision-making. If this activity can be encouraged at the starting point, the process will develop easily and naturally.

5. General Considerations - Perhaps the most important contribution the Game Director can make is by controlling the flow of play. The Director can only develop the timing required for this action by supervising several plays. However, a good deal of this is inherent and it comes to the fore quickly. In simple terms, play must not be allowed to drag. The Director must encourage activity, communication and bargaining on the part of the players; but he must not do it himself! The Director can call elections at any time, and of course this is an ideal way to break up a lag in play or put pressure on the government. Similar objectives can be met without removing the government by calling a Town Meeting in which public officials can be questioned by the electorate. At least one of these activities should be utilized approximately every third round.

In summary, the Game Director has substantial leeway to make judgments relative to timing and events as well as serving as the judiciary and legal system. It is the sense of timing on the part of the Game Director, however, which often can be the decisive factor in a successful and rewarding play. In order to fully aid this sense, the Director should become as thoroughly familiar as he can with the information necessary for each and every player's role.

In short, a Game Director requires three elements for success in running City I:

1. A thorough knowledge of the material
2. An innate sense of timing
3. The desire and motivation to creatively manage an innovative learning experience.

V. EXAMPLES OF DECISION CODES AND FORMATS

A. MUN (Government Decisions)

1. Enter the Departments' Appropriations for the Round

(The Chairman and Council notify the computer of the budget figures)

NAME: LB

FORMAT: ENTER FUNDING (IN THOUSANDS) FOR PWS, SC, HY, PZ

EXAMPLE: The appropriations for Public Works are \$102,000; for Schools, \$132,000; for Highways, \$97,000; for Planning and Zoning, \$22,000.

2. Set Tax Rates and Enter Tax Base Estimates

NAME: TR

FORMAT: ENTER TAX RATES -- PROPERTY, SALES, INCOME -- IN TENTHS OF PERCENTS

EXAMPLE: The tax rates are to be 2.9% on property, 1.5% on sales, and 2.0% on income.

The program then asks for the tax base estimates

FORMAT: ENTER TAX BASE ESTIMATES -- PROPERTY, SALES, INCOME IN THOUSANDS

EXAMPLE: The tax base estimate on property, \$7,875,000; on sales, \$73,800, on income, \$452,000.

3. Public Land Purchase

NAME: PU

FORMAT: LOCATION, AMOUNT (IN HUNDREDS), PURCHASER (SC, HY, PW, PZ), SELLER, 1 TO BUY PART, 1 TO ASSURE PURCHASE OR -1 TO ASSURE FAILURE

EXAMPLE: F has agreed to sell 1/8 of parcel 90-14 to the Highway Department for \$1,000.

4. Build Utility Lines and Plants

NAME: BU

FORMAT: LOCATION OF PLANT, 1 TO BUILD IT -- 0 ELSE/ A LIST OF NEW SQUARES TO BE SERVICED BY IT (SEPARATED BY SLASHES) (After last slash, **)

EXAMPLE: Public Works and Safety Department is installing utilities on parcels 94-32 and 94-30, to be serviced by the plant at 97-35. The plant at 77-13 will serve utilities to be installed at 76-20 and 76-22.

A new plant is to be built at 103-31 and will serve parcels 104-30 and 106-30.

Note: Unlike all other input programs, BU must be repeated for a second line of input. It automatically returns to the MUN main program after each line of input.

5. Change Zoning Classification on a Parcel

NAME: ZO

FORMAT: TYPE IN SQUARE NUMBER, NEW ZONING CODE, 1 IF MORE THAN CHANGES (the program will accept only 5 changes unless a 1 is typed in one of the first 5 changes)

EXAMPLE: Planning and zoning wishes to change the zoning on 74-12 from 20 to 10.

6. Build Schools or Change Teacher Assignment

NAME: BS

FORMAT: LOCATION OF SCHOOL, NUMBER OF HIGH, MEDIUM INCOME EMPLOYEES, 0 (BUILD) or 1 (CHANGE)

EXAMPLE: We build a school at 84-18 employing 400 high-income and 300 middle-income teachers.

Change the number of teachers at 74-12 to 200 high and 400 middle.

7. Renovate Schools

NAME: RS

FORMAT: LOCATION OF SCHOOL TO RENOVATE, VALUE RATIO DESIRED

EXAMPLE: Renovate the school at 74-12 to a value ratio of .95

8. Build Municipal Services or Change Employee Assignment

NAME: BM

FORMAT: LOCATION OF SERVICE, NUMBER MEDIUM EMPLOYEES, NUMBER OF LOW EMPLOYEES, 0 (BUILD) OR 1 (CHANGE)

EXAMPLE: Build an MS at 102-38 with 400 middle-income employees and 300 low-income employees.

Change the number of employees at 96-36 to 500 middle and 200 low.

9. Renovate Municipal Services

NAME: RM
FORMAT: LOCATION OF SERVICE TO RENOVATE, VALUE RATIO DESIRED
EXAMPLE: Renovate an MS at 96-36 to a value ratio of .97

10. Demolish MS or School

NAME: DS
FORMAT: WHAT TO DEMOLISH ('SC' or 'MS'), LOCATION
EXAMPLE: Demolish a school at 74-12.
Demolish an MS at 96036.

11. Change MS or School Employee Salaries

NAME: CH
FORMAT: DEPT. CODE (PW or SC) NEW SALARIES FOR LOW, MEDIUM, HIGH
INCOME EMPLOYEES/\$100.
(ROUTINE SELECTS CORRECT TWO).
EXAMPLE: Change school salaries to \$5,200 for middle-income and
\$10,400 for high income.

12. Build or Upgrade Roads

NAME: UR
FORMAT: SEGMENT LOCATION, NEW ROAD TYPE
EXAMPLE: Upgrade segments 84-13 to Type I and 86-13 to Type II.

13. Renovate Roads

NAME: RR
FORMAT: SEGMENT LOCATION, NEW VALUE RATIO
EXAMPLE: Renovate segments 74-13 and 76-13 to a value ratio of .97

14. Build or Upgrade Terminals

NAME: BT
FORMAT: INTERSECTION LOCATION, NEW TYPE
EXAMPLE: Build a Type I terminal at 83-17.

B. City I (Economic Decisions)

1. Headings for Output

This program allows you to label output for a specific group of players. It is particularly useful if several different groups are playing the game off the same computer. The heading appears on each output page.

NAME: HD
FORMAT: HEADING, MAXIMUM 80 CHARACTERS

EXAMPLE: The heading appears on each output page. Type whatever heading indicates which group played the round, e.g., **** Economics 104 Class ****, **** Altoona High School Teachers ****, ***** Ec. 104, January 9, 1969 ****, including the date, if desired.

Note: The heading remains the same for each round, unless changed, so it is not necessary to input one each round.

2. Loans from Bank or Another Team

NAME: LO
FORMAT: TEAM NAME, AMOUNT OF LOAN (IN HUNDREDS OF DOLLARS), SOURCE OF LOAN (TEAM NAME OR OUTSIDE) (if team), TERM, INTEREST RATE IN TENTHS OF PERCENTS.

EXAMPLE: B is borrowing \$25,000 from the National Economy.

C is borrowing \$34,000 from D at an interest rate of 6% and a term of 5 rounds.

Note: The computer handles loan payments each round automatically. Players do not have to worry about collecting or paying.

3. Cash Transfer at No Cost to Team

NAME: CT
FORMAT: TEAM GIVING (OU FOR National Economy), TEAM RECEIVING (team name or OU), AMOUNT/\$100

EXAMPLE: E gives F \$4,600.

The operator wishes to give G an additional \$85,000.

The operator wishes to deduct \$60,000 from B's cash.

4. Subsidy from Chairman

NAME: SB
FORMAT: TEAM RECEIVING, AMOUNT/\$100

EXAMPLE: The County is subsidizing A for \$4,500.

5. Invest Outside the Local Economy

NAME: IN
FORMAT: TEAM NAME, AMOUNT/\$100, TYPE (SP, BC)
(SP=speculative, BC=conservative)

EXAMPLE: H wishes to spend \$12,000 on conservative investments.

The same procedure is followed when a team wishes to sell some of its stock. For example, C has \$6,000 worth of speculative investments and wishes to sell \$3,000.

C wishes to reinvest the money in a conservative investment.

Note: Sales of investments should be processed before purchases.

6. Restore slums

NAME: RS
FORMAT: OWNER, LOCATION

EXAMPLE: D is restoring its slums at 74-12.

7. Purchase Land by Private Team

NAME: PU
FORMAT: ENTER LOCATION, AMOUNT (HUNDREDS),
PURCHASER, SELLER (CI if PZ is selling),
1 BUY PART, (OR -1 IF PURCHASING ALL PARKLAND ON PARCEL),
1 TO ASSURE PURCHASE OR -1 TO ASSURE FAILURE

EXAMPLE: E wishes to bid \$5,000 for the unowned parcel 92-14.

G has received permission from Planning and Zoning to buy back part of one portion of 100-32 which was owned by the county for parkland. (When the seller is the county, type CI).

Note: If the operator wishes to assure that a team acquires a parcel of land from the outside, type the 1 to condemn, e.g., 9216, 50, A, OU, 0, 1. A -1 assures that a team does not get the land.

A -1 in the part-of-parcel space buys all the parkland on the parcel.

If an economic team purchases land from another economic team, any buildings on the parcel are also transferred. The value of the land for assessment purposes is assumed to be the sale price less the development cost of the buildings times their value ratio.

8. Demolish Residences

NAME: DR
FORMAT: OWNER, LOCATION, NEW LEVEL

EXAMPLE: B is demolishing 4 units of its RA5 at 74-14.

9. Demolish Businesses

NAME: DB
FORMAT: OWNER, LOCATION NEW LEVEL

EXAMPLE: H is demolishing its LI1 at 74-16.

10. Renovate Any Land Use

NAME: RN
FORMAT: OWNER, LOCATION, NEW VALUE RATIO DESIRED

EXAMPLE: B wishes to renovate its Business Goods 2 at 74-12 to a value ratio of .95.

D is renovating its RA3 at 76-18 to 1.00.

11. Build or Upgrade Residences

NAME: BR
FORMAT: OWNER, LOCATION, NUMBER OF NEW RESIDENCES, SOCIAL CLASS
(1=LOW, 2=MEDIUM, 3=HIGH)

EXAMPLE: A is building two middle-income residences, on the previously undeveloped 100-38.

F is upgrading its RC3 at 94-38 to be an RC5.

12. Build Businesses

NAME: BB

FORMAT: OWNER, LOCATION, BUILDING TYPE, LEVEL. TYPE SALARIES OFFERED TO LOW, MEDIUM, HIGH EMPLOYEE/\$100 (if BG or BS), TYPE CHARGES TO LEVEL 1 RESIDENCE LOW, MEDIUM, HIGH/\$10.

EXAMPLE: A is building a BG2 at 100-38 offering salaries of \$2,600 to low-income people, \$5,100 to middle-income, \$10,000 to high-income, and setting the following prices to LI1, \$27,000; HI1, \$19,000; PG1, \$4,500.

E is building a HI1 at 100-34, offering a salary of \$2,500 to low-income people, \$5,000 to middle, and \$10,000 to high.

D is developing a PG3 at 98-30, paying low-income people \$2,600, middle-income \$5,200, high-income \$10,400, and setting the following prices: RA1, \$900; RB1, \$1,600; RC1, \$3,150.

13. Upgrade Businesses

NAME: UB

FORMAT: OWNER, LOCATION, NEW LEVEL

EXAMPLE: G is upgrading its HI2 at 70-14 to HI3.

E is increasing its PG1 at 98-36 to PG2.

14. Change Prices or Salaries

NAME: CS

FORMAT: LOCATION, 1 TO CHANGE PRICES OR 2 TO CHANGE SALARIES, (if 1 and if BG or BS) TYPE NEW CHARGES TO LEVEL 1 LI, HI, PG, PS/\$10

EXAMPLE: A wishes to raise the salaries at its HI1 at 98-34 to \$2,700 for low and \$5,400 for middle income employees, but high-income will remain \$10,000.

G is changing the prices at its BG1 at 78-10 for LI1 to \$21,000 for HI1 to \$17,000 and for PG1 to \$4,000.

C. Samples

//bXEQbCITYI

\$LB

102,132,97,22

**

\$TR

29,15,20

7875,74,452

**

\$PU

9014,10,HY,F,1

**

\$BU

9735,0/9432/9430/**

\$BU

7713,0/7620/7622/**

\$BU

10331,1/10430/10630/**

\$ZO

7412,10

**

\$BS

8418,400,300,0

7412,200,400,1

**

\$RS

7412,95

**

\$BM

10238,400,300,0

9636,500,200,1

**

\$RM

9636,97

**

\$DS

SC,7412

MS,9636

**

\$CH

SC,0,52,104

**

\$UR

8413,1

8613,2

**

\$RR
 7413,97
 9613,97
 **
 \$BT
 8317,1
 **
 \$CI
 \$HD
 *****ECONOMICS 104 CLASS *****
 **
 \$LO
 B,250,OU
 C,340,D,5,60
 **
 \$CT
 E,F,46
 OU,G,850
 B,OU,600
 **
 \$SB
 A,45
 **
 \$IN
 H,120,BC
 C,130,SP
 C,30,BC
 **
 \$RS
 D,7412
 **
 \$PU
 9214,50,E,OU
 10032,12,G,CI,1
 9216,50,A,OU,0,1
 **
 \$DR
 B,7414,1
 **
 \$DB
 H,7416,0
 **
 \$RN
 B,7412,95
 D,7618,100
 **
 \$BR
 A,10038,2,2
 F,9438,2,3

**
\$BB
A,10038,BG,2
26,51,100
2700,1900,450
E,10034,HI,1
25,50,100
D,9830,PG,3
26,52,104
90,160,315

**
\$UB
G,7014,3
E,9836,2

**
\$CS
9834,2
27,54,100
7810,1
2100,1700,400

**
blank card

VI. GENERAL INFORMATION

A. Description of General Computer Output

The following is a description of general computer output that is not distributed to specific teams. This output should be posted at a central point so that all players can refer to it.

1. The Status Map

At the beginning of each round a status map showing the physical development of the county at that time is posted in the game room. The status map shows such public developments as the highway network, terminals, utility plants, the location of utility service, municipal services, schools, and parkland. The status map also shows the ownership of square mile parcels of land and the type and density of development for developed parcels. The status map because of space limitations, does not have the last two columns. It is a 23 x 25 matrix with 575 squares. Even numbered horizontal coordinates for the status map range from 70 to 114, and even-numbered vertical coordinates range from 12 to 60.

2. The Change Map

The change map shows the land use changes that occurred during the last round. All new construction, upgrading, demolition and changes of land ownership are shown. At all times, only the new condition of a parcel is indicated, not its previous condition.

3. The Summary of Economic Status

This summary sheet shows 16 items of financial information for each of the nine (A through I) economic teams. These same items also appear on output given to the individual teams.

4. Distribution of Population

This output shows the total population of the county in addition to indicating the population of each of the four political jurisdictions (Central City, Estateville, Farmington and Newtown).

Distribution of Population -- Number of People Residing in Residences

This output shows the number of people residing in residences owned by each of the nine economic teams. Information is broken down by income class and by jurisdiction. People residing in a residence are controlled by the team owning the residence.

5. Voting Power of Teams

Economic teams vote on behalf of the people who live in their residences. This output shows the average turnout for any election held during the round. There is a deviation applied to the average for each particular voting issue. On the average, each RC1 has 700 votes; each RB1 has 575; and RA1 has 420; and each RS1 has 336. The actual number of voters who turn out can deviate by as much as 90 for an RC1, 123 for an RB1, 250 for an RA1 and 310 for an RS1.

6. Real Assets

This shows the number of each type of residential and business land uses and undeveloped land controlled by each team.

Undeveloped land is classified as either conditional or unconditional. Conditional refers to parcels on which the public sector owns part. Such land can be developed only residentially, regardless of its zoning, unless the owner purchases the public land. Unconditional land may be developed in any land use in conformity with zoning and utility restrictions.

7. Socio-Economic Parameters for the Round

This output sheet shows the probability of any economic team's attempt to develop a residence unit being accepted by the computer. For example, if the growth desirability factor is 75 percent, then every time a team attempts to construct a residence unit, there is a 75% chance that the unit will actually be constructed. That is, 25% of the attempts to construct residential units will not be accepted because the socio-economic indicators of the local community are such that potential in-migrants are discouraged from moving into the local system.

* STATUS MAP FOR ROUND 1, TEAM *

	70	72	74	76	78	80	82	84	86	88	90	92	94	96
12	E HI3	F HI2	I RS6	C RA3	MU PARK	B RC4	H RC4	E RC2	MU PARK	MU PARK	F	H		
14	G HI2	H BG3	B RA5	I MU	I RB4	D LI2	F PS2	B RB2	G RB1	H RC1	E RC1			
16	A RA6	F BS1	C RA4	I PG3	C RB3	C RC2	A RC1	MU U	E RB1	D	I U			
18	D RB1	H RB3	C PS2	I RA3	C RB3	MU PARK	E RB2	F RB1	G RB1	G U	B RC1	F		
20	E RA1	MU PARK	D HI3	A HI2	C BG1	G BS2	MU PARK	D U	MU PARK	F RC1	MU PARK			
22	D U	B RB3	B BG2	G HI1	F RA3	C LI1	I RB2	E PG3	A U	MU PARK	H	G		
24	B RC1	C RC2	H PG1	B RB3	H RA3	A PS1	A RC3	G RB1	B RC1		D			
26	I RC1	H RB1	H LI1	B RC1	A BS1	E U	A RC1	D U	G U	H	F			
28	A U	F RC1	D U	E U	D RC2	G RC1	I RC1	F RB1	MU PARK					
30				I			B LI1	H U						
32			C				I RB2		C					
34														
36														
38														
40														
42												G	F PS1	
44												B U	B RB2	

TOP - OWNER OR MU (MUNICIPAL)
 MIDDLE - LAND USE AND LEVEL OR
 U - UTILITIES PRESENT (UNDEVELOPED)
 BOTTOM LEFT - UNITS OF PARK
 BOTTOM MIDDLE - S (SCHOOLS)
 BOTTOM RIGHT - M (MUNICIPAL SERVICE)

ROADS
 # OR = - TYPE 1
 I OR = - TYPE 2
 I OR = - TYPE 3
 - ROADBED

* CHANGE MAP FOR ROUND 1, TEAM *

	70	72	74	76	78	80	82	84	86	88	90	92	94	96
12	E HI3	F HI2	RS6	C RA3	MU PARK	B RC4	H RC4	E RC2	MU PARK	MU PARK	F	H		
14	G HI2	BG3	RA5	MU U	I RB4	D LI2	F PS2	B RB2	G RB1	H RC1	E RC1			
16	A RA6	F BS1	C RA4	I PG3	C RB3	C RC2	A RC1	MU U	E RB1	H D	I U			
18	D RB1	H RB3	C PS2	I RA3	C RB3	MU PARK	E RB2	F RB1	G RB1	H U	B RC1	F		
20	E RA1	MU PARK	D HI3	A HI2	C BG1	G BS2	MU PARK	D U	MU PARK	F RC1	MU PARK			
22	D U	B RB3	BG2	G HI1	F RA3	C LI1	I RB2	E PG3	A U	MU PARK	H	G		
24	B RC1	C RC2	H PG1	B RB3	H RA3	A PS1	A RC3	G RB1	B RC1		D			
26	I RC1	H RB1	H LI1	B RC1	A BS1	E U	A RC1	D U	G U	H	F			
28	A U	F RC1	D U	E U	D RC2	G RC1	I RC1	F RB1	MU PARK					
30							B LI1	H U						
32			C				I RB2		C					
34														
36														
38														
40														

PARCELS

TOP - OWNER OR MU (MUNICIPAL)
MIDDLE - LAND USE AND LEVEL OR
U IF UTILITIES PRESENT (UNDEVELOPED)
BOTTOM LEFT - UNITS OF PARK
BOTTOM MIDDLE - S (SCHOOLS)
BOTTOM RIGHT - M (MUNICIPAL SERVICE)

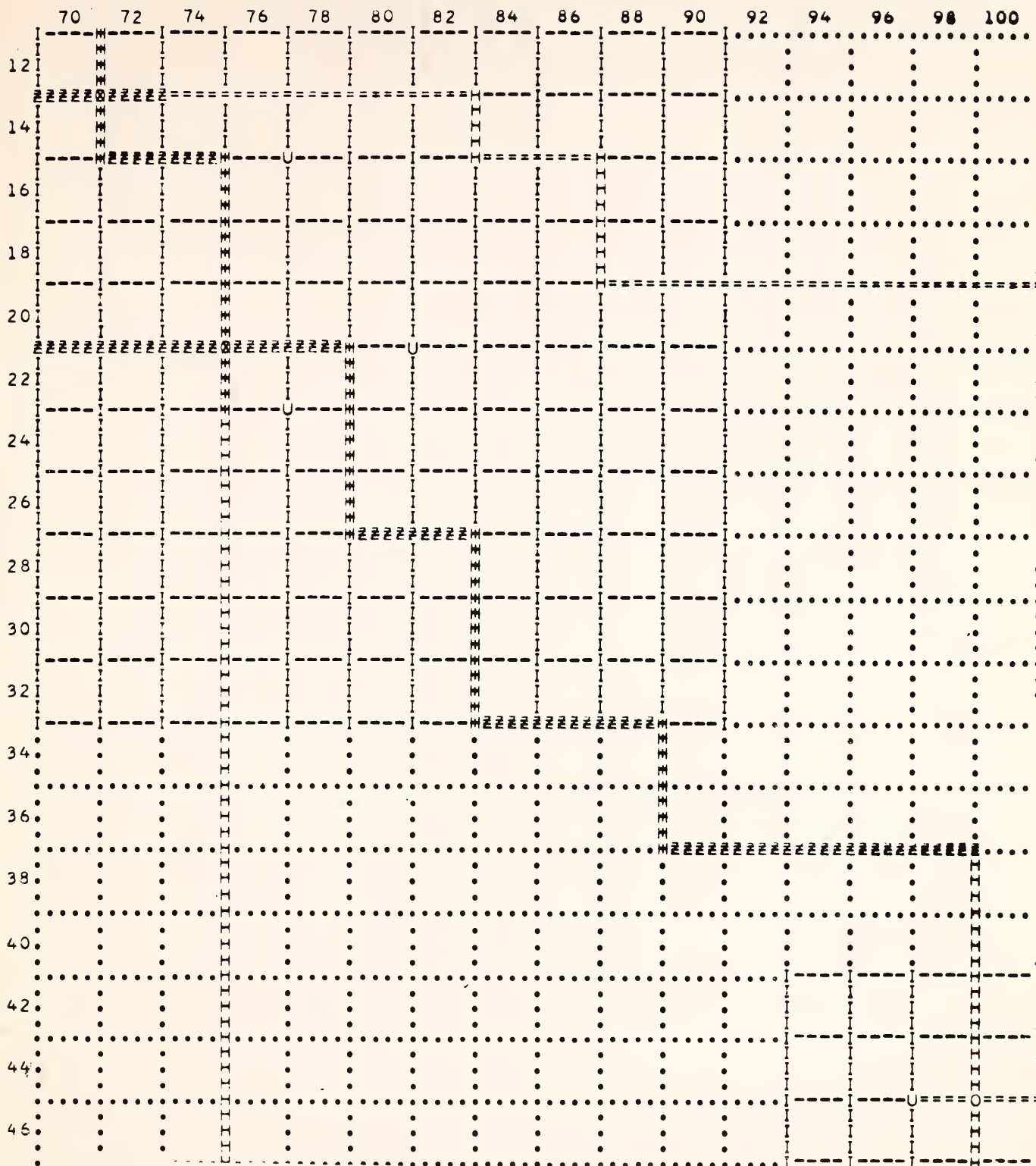
ROADS

OR = - TYPE 1
H OR = - TYPE 2
I OR - - TYPE 3
..... - ROADBED

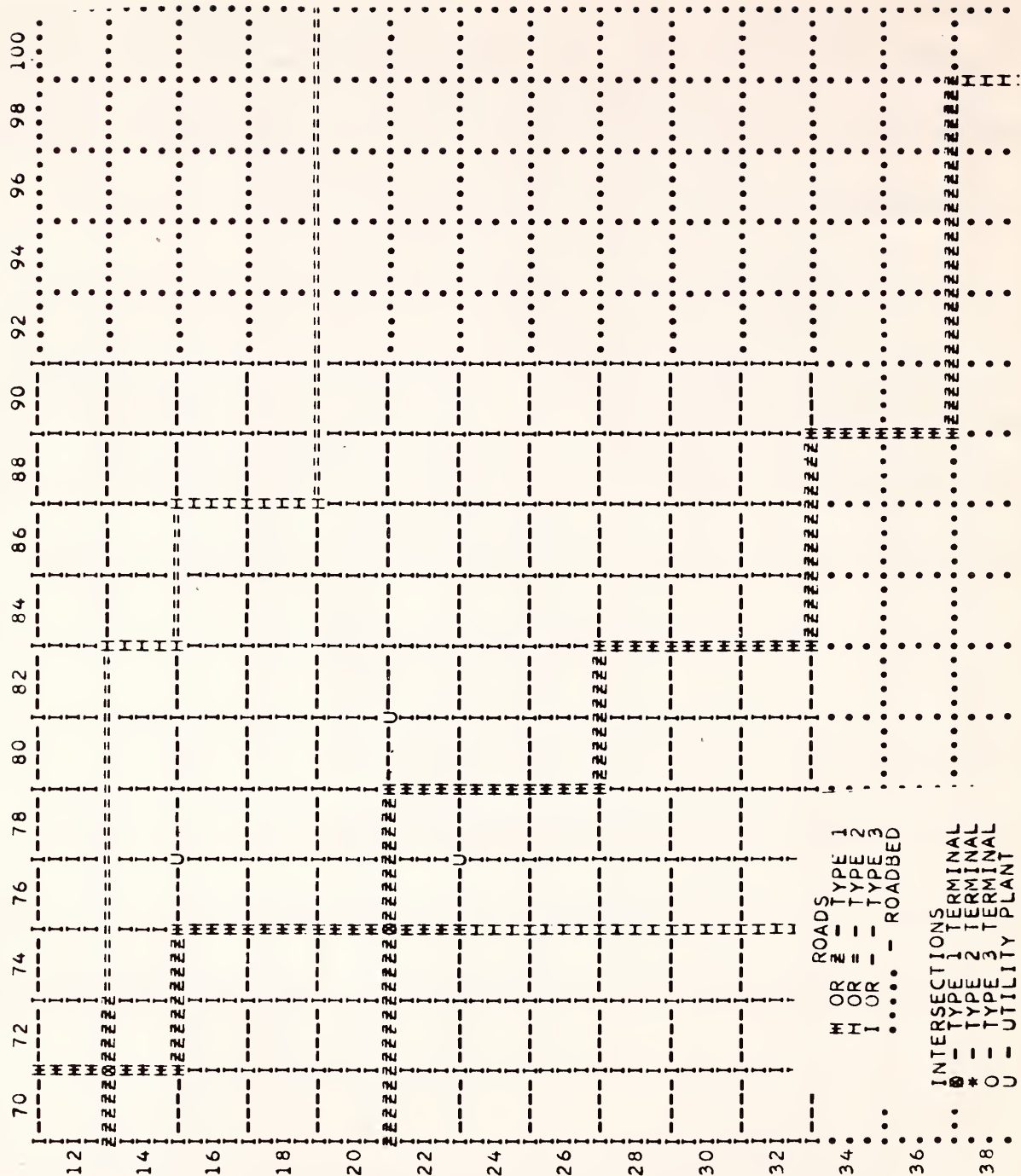
INTERSECTIONS

⊗ - TYPE 1 TERMINAL
* - TYPE 2 TERMINAL
O - TYPE 3 TERMINAL
U - UTILITY PLANT

* NUROAD MAP FOR ROUND 1, TEAM H *



* HIWAY MAP FOR ROUND 1, TEAM H *



* * * * * SUMMARY OF ECONOMIC STATUS - ROUND 1 * * * * *

	A	B	C	D	E	F	G	TOTAL
GROSS INCOME	174513.	309951.	250216.	288796.	320916.	201004.	247727.	2365598.
TRANS. CHARGES	2710.	13530.	7310.	14200.	4830.	2610.	2430.	65120.
SERVICE CHARGES	98760.	157040.	129190.	149060.	156190.	91480.	107760.	1190680.
WAGE COSTS	57500.	37500.	47500.	87500.	90000.	72500.	70000.	565000.
TAXES	12880.	17928.	15880.	11945.	14747.	12425.	12202.	127150.
NET INCOME	2662.	83953.	50336.	26090.	55149.	21988.	55335.	417648.
PREV. CASH BAL.	220000.	195000.	225000.	302000.	250000.	315000.	310000.	2342000.
NEW CONSTRUCTION	0.	0.	0.	0.	0.	0.	0.	0.
PROPERTY BOUGHT	0.	0.	0.	0.	0.	0.	0.	0.
PROPERTY SOLD	0.	0.	0.	0.	0.	0.	0.	0.
SUBSIDIES REC'D	0.	0.	0.	0.	0.	0.	0.	0.
NEW CASH BAL.	233662.	288703.	286586.	343190.	317649.	352739.	380835.	2876748.
PROPERTY OWNED	595500.	795100.	718300.	564400.	669200.	578600.	565400.	5790901.
INVESTMENTS	0.	0.	0.	0.	0.	0.	0.	0.
OUTSTANDING DEBTS	0.	0.	0.	0.	0.	0.	0.	0.
NET WORTH	829163.	1083803.	1004886.	907590.	986849.	931339.	946235.	8667646.

* * * * * DISTRIBUTION OF POPULATION - ROUND 1 * * * * *

CENTRAL CITY	274400
ESTATEVILLE	15200
FARMINGTON	29200
NEWTOWN	47500

TOTAL	366300

There are twelve factors which affect the growth desirability factor. The growth desirability factor begins at 100% and decreases in proportion to the value at which a certain factor begins to affect it. For example, one of the most important factors is the county unemployment rate. A county unemployment rate above 4% adversely affects the growth desirability factor, with a reduction of 5 percentage points for every one percentage point increase in the unemployment rate.

The point at which any factor begins to affect the probability index (Column A) and the actual change in the factor needed to bring about a reduction of one percentage point in the probability index (Column B) are given in the table below:

<u>Factor</u>	<u>A</u>	<u>B</u>
School Department		
Student Served Outside	8,000	+ 3,300
Value ratio of schools	.80	- .02
Student/teacher ratio	15.0	+ .2
Students/school unit	10,000	+ 1,000
Public Works and Safety		
Department		
Value Ratio of Municipal		
Service	.80	- .02
Population/Employment Ratio	40.0	+ .33
Population/Service	40,000	+ 2,000
Builds Refused for lack of		
utility service	2	+ .5
Highway Department		
Overall Transportation		
Cost Increment*	10	+ 4
Planning and Zoning Department		
Population/Square mile of		
Parkland	30,000	+ 1,000
Economic Factors		
Unemployment Rate (%)	4	+ .2
Mean Salary (\$)	5,800	+ 200

*The overall transportation cost increment is the weighted average of the cost increment of all the individual road segments.

8. Employment Status

This output summarizes the conditions of the labor market for the simulated area.

The computer allocates all workers to jobs. In the employment allocation process all high-income workers look for high-income jobs. Any high-income workers who do not find jobs are the first hired for middle-income salary. Likewise, any middle-income workers who do not find middle-income jobs are the last people considered for jobs, so they have the greatest likelihood of not finding work.

For example, suppose that the total number of job openings for high-income (RC) worker units is 34. However, there are 37 high-income worker units in the labor force. Consequently three high-income worker units have become employed in middle-income jobs. Further, there are 42 middle-income job openings and 40 middle-income (RB) worker units looking for jobs. Since three high-income worker units were allocated to middle-income jobs, one middle-income worker unit is forced to become employed at a low-income job.

Any workers not in the labor market are temporarily not looking for jobs because the residence unit either was lowered in class due to deterioration or was struck by a natural disaster. The next to the last row of the table shows the number of parcels occupied by residences of each class. The last row contains the number of residence units which had to be hired from the outside to fill jobs left vacant due to a shortage of labor.

When there are residence units not in the labor market or businesses hiring labor from outside, the locations of those residences or businesses are printed below the summary table.

9. Outside Economic Status Report

This output sheet shows the influence of national (or Outside) business conditions on the local economy for the past round. The gains on speculative and conservative investments are the returns on funds invested in these two types of national investments. For example, \$10,000 invested at the beginning of a round in speculative stocks might return \$800, thereby bringing the total invested to \$10,800 at the end of the round.

The average outside economy loan rate is the interest rate for loans by teams from the Outside Economy.

* * * * * DISTRIBUTION OF POPULATION - ROUND 1 * * * * *

NUMBER OF PEOPLE RESIDING IN RESIDENCES

SLUM	A	B	C	D	E	F	G	TOTAL
CENTRAL CITY	0	0	0	0	0	0	0	13800
ESTATEVILLE	0	0	0	0	0	0	0	0
FARMINGTON	0	0	0	0	0	0	0	0
NEWTOWN	0	0	0	0	0	0	0	0
TOTAL	----- 0	----- 0	----- 0	----- 0	----- 0	----- 0	----- 0	----- 13800
LOW INCOME								
CENTRAL CITY	13800	11500	16100	0	2300	6900	0	64400
ESTATEVILLE	0	0	0	0	0	0	0	0
FARMINGTON	0	0	0	0	0	0	0	0
NEWTOWN	2300	0	0	0	4600	4600	0	11500
TOTAL	----- 16100	----- 11500	----- 16100	----- 0	----- 6900	----- 11500	----- 0	----- 75900
MIDDLE INCOME								
CENTRAL CITY	0	27200	20400	3400	10200	3400	10200	108800
ESTATEVILLE	0	0	0	0	0	0	0	0
FARMINGTON	0	0	0	0	0	3400	0	10200
NEWTOWN	0	6800	0	0	10200	0	0	17000
TOTAL	----- 0	----- 34000	----- 20400	----- 3400	----- 20400	----- 6800	----- 10200	----- 136000
HIGH INCOME								
CENTRAL CITY	19000	26600	15200	0	7600	0	0	87400
ESTATEVILLE	0	3800	0	0	3800	3800	0	15200
FARMINGTON	0	0	0	7600	0	3800	3800	19000
NEWTOWN	0	0	7600	0	0	0	0	19000
TOTAL	----- 19000	----- 30400	----- 22800	----- 7600	----- 11400	----- 7600	----- 3800	----- 140600
TOTAL NUMBER OF PEOPLE	35100	75900	59300	11000	38700	25900	14000	366300

VOTING POWER OF TEAMS

	A	B	C	D	E	F	G	H	I
CENTRAL CITY	6020	11600	9190	575	3545	1835	1725	6360	7426
AVERAGE TURNOUT	1950	2864	2848	123	799	873	369	1602	3438
STANDARD DEVIATION									
ESTATEVILLE	0	700	0	0	700	700	0	700	0
AVERAGE TURNOUT	0	90	0	0	90	90	0	90	0
STANDARD DEVIATION									
FARMINGTON	0	0	0	1400	0	1275	700	0	1850
AVERAGE TURNOUT	0	0	0	180	0	213	90	0	336
STANDARD DEVIATION									
NEWTOWN	420	1150	1400	0	2565	840	0	2100	0
AVERAGE TURNOUT	250	246	180	0	869	500	0	270	0
STANDARD DEVIATION									

***** REAL ASSETS - ROUND 1 *****

NUMBER OF RESIDENCES OWNED

	A	B	C	D	E	F	G	TOTAL
SLUM								
CENTRAL CITY	0	0	0	0	0	0	0	6
ESTATEVILLE	0	0	0	0	0	0	0	0
FARMINGTON	0	0	0	0	0	0	0	0
NEWTOWN	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	6
LOW INCOME								
CENTRAL CITY	6	5	7	0	1	3	0	28
ESTATEVILLE	0	0	0	0	0	0	0	0
FARMINGTON	0	0	0	0	0	0	0	0
NEWTOWN	1	0	0	0	2	2	0	5
TOTAL	7	5	7	0	3	5	0	33
MIDDLE INCOME								
CENTRAL CITY	0	8	6	1	3	1	3	32
ESTATEVILLE	0	0	0	0	0	0	0	0
FARMINGTON	0	0	0	0	0	0	0	0
NEWTOWN	0	2	0	0	3	1	0	3
TOTAL	0	10	6	1	6	2	3	40
HIGH INCOME								
CENTRAL CITY	5	7	4	0	2	0	0	23
ESTATEVILLE	0	1	0	0	1	1	0	4
FARMINGTON	0	0	0	2	0	1	1	5
NEWTOWN	0	0	2	0	0	0	0	5
TOTAL	5	8	6	2	3	2	1	37
TOTAL NUMBER OF RESIDENCE UNITS	12	23	19	3	12	9	4	116

* * * * * REAL ASSETS - ROUND 1 * * * * *

NUMBER OF BUSINESSES OWNED

	A	B	C	D	E	F	G	TOTAL
LIGHT INDUSTRY								
LEVEL 1	0	1	1	0	0	0	0	4
LEVEL 2	0	0	0	1	0	0	0	1
LEVEL 3	0	0	0	0	0	0	0	0
HEAVY INDUSTRY								
LEVEL 1	0	0	0	0	1	0	1	2
LEVEL 2	1	0	0	0	0	1	1	3
LEVEL 3	0	0	0	1	1	0	0	2
BUSINESS GOODS								
LEVEL 1	0	0	1	0	0	0	0	1
LEVEL 2	0	1	0	0	0	0	0	1
LEVEL 3	0	0	0	0	0	0	0	1
BUSINESS SERVICES								
LEVEL 1	1	0	0	0	0	1	0	2
LEVEL 2	0	0	0	0	0	0	1	1
LEVEL 3	0	0	0	0	0	0	0	0
PERSONAL GOODS								
LEVEL 1	0	0	0	1	0	0	0	2
LEVEL 2	0	0	0	0	0	0	0	0
LEVEL 3	0	0	0	0	1	0	0	2
PERSONAL SERVICES								
LEVEL 1	1	0	0	0	0	1	0	2
LEVEL 2	0	0	1	0	0	1	0	2
LEVEL 3	0	0	0	0	0	0	0	0

NUMBER OF PARCELS OF UNDEVELOPED LAND OWNED

CONDITIONAL	1	0	1	1	0	1	0	5
UNCONDITIONAL	3	1	2	6	2	3	5	30

-----SOCIO-ECONOMIC PARAMETERS FOR ROUND 1

FACTOR	VALUE	EFFECT
SCHOOL DEPARTMENT		
STUDENTS SERVED OUTSIDE	11400.	-10.2
VALUE RATIO OF SCHOOLS	0.825	0.0
STUDENT/TEACHER RATIO	12.9	0.0
STUDENTS/SCHOOL UNIT	8620.	0.0
PUBLIC WORKS DEPARTMENT		
VALUE RATIO OF MUNICIPAL SERVICE	0.845	0.0
POPULATION/EMPLOYMENT RATIO	33.2	0.0
POPULATION/SERVICE	28.	0.0
BUILDS REFUSED FOR LACK OF UTILITY SERVICE	0.	0.0
HIGHWAY DEPARTMENT		
OVERALL TRANSPORTATION COST INCREMENT	22.	-3.0
PLANNING AND ZONING DEPARTMENT		
POPULATION/SQUARE MILE OF PARKLAND	24810.	0.0
ECONOMIC FACTORS		
UNEMPLOYMENT RATE(PERCENT)	0.	0.0
MEAN SALARY (DOLLARS)	6056.	0.0

THE GROWTH DESIRABILITY FACTOR FOR THE NEXT ROUND WILL BE 86.8

The industry income (ratio to normal) is the ratio of actual income earned by basic industry in the local system to the average gross income as listed in the Master Information Sheet. For example, if the ratio is .90, then all basic industries in the local economy that have value ratios of 1.00 receive 90% of their average gross incomes.

10. Predictions

This output sheet shows the same type of information as the previous output sheet, except that the values relate to the current round of play. That is, they indicate what stock investments will return, what the outside interest rate will be, and what the industry income ratio will be for the current round.

11. Assessed Value of Land Map

The assessed value map shows the assessed value of land in hundreds of dollars. The assessed values change each round in response to sales of parcels at prices different from the previous assessed value. When a parcel is sold, the sale price is averaged with the previous assessed value and the result becomes the new assessed value. The assessed value of a parcel affects the assessed values of adjoining parcels, so a land sale at a high price would tend to raise the assessments on all adjoining parcels.

12. Property Damage

This output lists the location of land uses that were damaged by natural disaster during the past round.

Developments may be struck by natural disaster (tornado, hurricane, flash flood). The chances of such disaster occurring increase as the condition (value ratio) of a building declines. All buildings depreciate each round. Players may counteract this deterioration by renovating buildings under their control.

The extent of damage to a residence struck by natural disaster depends on the quality of Municipal Service serving the residence. The level of protection supplied by an MS unit is dependent upon the number of people it serves, its value ratio, the total number of employees, and the number of middle-income and low-income employees.

If a residence unit is damaged more than 50%, its labor force is temporarily removed from the labor market for that round and earns no income.

13. Residence Income Class Succession

If a residence deteriorates below a value ratio of .50, it becomes part of the next lower class. Remember high-income people live in RC, middle-income people live in RB, and low-income people live in RA and RS is a slum. When this occurs, the inhabitants are not in the labor market for one round while the class of the population is changing, i.e., while the higher class is moving out and the next lower class is moving in.

For each such residential parcel, the location, old and new residential class, and old value ratio is listed. Once the residence has dropped to a lower class, the new value ratio automatically becomes 1.00.

14. Danger of Lowering of Income Class

This output shows the residential property that is in danger of becoming the next lowest class because of low value ratios. For each such residential parcel the location, present residential class, and present value ratio are listed.

* * * * * EMPLOYMENT STATUS - ROUND 1 * * * * *

THERE ARE 28 PARCELS OFFERING EMPLOYMENT

RESIDENCE UNITS	HIGH	MIDDLE	LOW	SLUM	TOTAL
JOB OPENINGS	34	42	40		116
IN THE LABOR MARKET	37	40	33	6	116
NOT IN THE LABOR MARKET	0	0	0	0	0
EMPLOYED IN LOWER INCOME BRACKET	3	1	0	0	4
UNEMPLOYED	0	0	0	0	0
NUMBER OF PARCELS OCCUPIED BY	23	20	11	1	55
LABOR FROM OUTSIDE ECONOMY	0	0	0	0	0

* * * * * OUTSIDE ECONOMIC STATUS REPORT - ROUND 1 * * * * *

FACTORS FOR THE OUTSIDE ECONOMY PARAMETERS

AVERAGE RATE OF RETURN ON SPECULATIVE INVESTMENTS	0.090
AVERAGE RATE OF RETURN ON CONSERVATIVE INVESTMENTS	0.060
AVERAGE OUTSIDE LOAN RATE	0.070
PROJECTED OUTSIDE LOAN RATE FOR ROUND 2	0.070
RATIO OF INDUSTRY INCOME TO NORMAL	1.000

* * * * * PREDICTIONS FOR ROUND 2 * * * * *

FACTORS FOR THE OUTSIDE ECONOMY PARAMETERS

AVERAGE RATE OF RETURN ON SPECULATIVE INVESTMENTS	0.104
AVERAGE RATE OF RETURN ON CONSERVATIVE INVESTMENTS	0.060
AVERAGE OUTSIDE LOAN RATE	0.070
RATIO OF INDUSTRY INCOME TO NORMAL	1.007

ASSESSED VALUE OF LAND - ROUND 1

	70	72	74	76	78	80	82	84	86	88	90	92	94	96	98	100	102	104
12	103	102	99	95	89	82	75	69	63	58	53	51	50	50	50	50	50	50
14	100	99	96	92	86	79	73	67	62	57	53	50	50	50	50	50	50	50
16	92	91	89	84	79	73	68	64	59	54	51	50	50	50	50	50	50	50
18	82	82	79	76	72	67	64	61	57	53	50	50	50	50	50	50	50	50
20	71	71	70	69	66	64	62	59	55	52	50	50	50	50	50	50	50	50
22	62	62	63	63	63	62	60	58	54	52	50	50	50	50	50	50	50	50
24	53	54	55	56	57	58	57	55	53	50	48	47	47	47	47	47	47	47
26	43	44	45	46	48	50	51	50	48	45	43	43	43	43	43	43	43	43
28	32	32	32	34	36	40	42	42	40	38	36	36	36	36	36	36	36	36
30	21	22	22	23	25	29	33	33	32	31	31	32	32	32	32	32	32	32
32	16	16	16	17	18	21	24	25	26	27	29	30	30	30	30	30	30	30
34	15	15	15	15	15	16	18	19	22	25	28	30	30	30	30	30	30	30
36	15	15	15	15	15	15	15	17	20	25	28	30	30	30	30	30	30	30
38	15	15	15	15	15	15	15	16	20	25	28	30	30	30	30	30	30	30
40	15	15	15	15	15	15	15	16	20	25	28	30	30	31	32	31	31	30
42	15	15	15	15	15	15	15	16	20	25	28	30	31	32	34	34	33	31
44	15	15	15	15	15	15	15	16	20	25	28	30	31	34	36	36	35	33
46	15	15	15	15	15	15	15	16	20	25	28	30	31	34	36	36	35	33
48	15	15	15	15	15	15	15	16	20	25	28	30	31	32	34	34	33	32
50	15	15	15	15	15	15	15	16	20	25	28	30	30	31	32	32	31	30
52	15	15	15	15	15	15	15	16	20	25	28	30	30	30	30	30	30	30
54	15	15	15	15	15	15	15	16	20	25	28	30	30	30	30	30	30	30
56	15	15	15	15	15	15	15	16	20	25	28	30	30	30	30	30	30	30
58	15	15	15	15	15	15	15	16	20	25	28	30	30	30	30	30	30	30
60	15	15	15	15	15	15	15	16	20	25	28	30	30	30	30	30	30	30
	70	72	74	76	78	80	82	84	86	88	90	92	94	96	98	100	102	104

* * VALUES ARE IN HUNDREDS OF DOLLARS * *

* * * * * PROPERTY DAMAGE - ROUND 1 * * * * *

THE F HI AT 7212 HAS BEEN 17 PER CENT DAMAGED

THE F BS AT 7216 HAS BEEN 34 PER CENT DAMAGED

THE D HI AT 7420 HAS BEEN 17 PER CENT DAMAGED

THE A HI AT 7620 HAS BEEN 30 PER CENT DAMAGED

THE C BG AT 7820 HAS BEEN 35 PER CENT DAMAGED

* * * * * DANGER OF LOWERING OF INCOME CLASS - ROUND 1 * * * * *

THE VALUE RATIO FOR THE TEAM B CLASS A RESIDENCE AT 7414 HAS DROPPED TO 0.534 •
THE INCOME LEVEL OF THIS PROPERTY WILL DROP UNLESS IT IS RENOVATED IMMEDIATELY.

THE VALUE RATIO FOR THE TEAM F CLASS A RESIDENCE AT 7822 HAS DROPPED TO 0.534 •
THE INCOME LEVEL OF THIS PROPERTY WILL DROP UNLESS IT IS RENOVATED IMMEDIATELY.

B. Glossary of Terms

(The underlined terms are defined elsewhere in the glossary.)

Appropriations -- Funds made available to the governmental departments by the Chairman to be spent on capital or current expenditures.

Assessment -- Each parcel of land is assessed every round on the basis of two criteria, its previous assessed value and the value of the surrounding properties. Every piece of property that is sold is assessed at a weighted average of the sale price and its previous assessed value. Developments are assessed at their development costs times their value ratios.

Basic Industry -- Land use sectors that earn income from the sale of their output to the National Economy are Basic Industries of which there are two types: heavy industry and light industry.

Bonds -- Public bonds are automatically floated by the computer if public expenditures exceed public revenue. The duration of each bond is five rounds. Bonds may be floated to a maximum of 13.3% of the assessed land and development value in the county. As more bonds are floated, the average interest rate on them increases.

Business Cycle -- The average business cycle position is 1.00 and the standard deviation is 0.1. The business cycle is a four-round cycle; that is, in an average four-round period there will be two rounds with above average business conditions, and two rounds with below the average. The income received by basic industry in a round from the sale of their output to the National Economy is affected in part by the position on the business cycle for that round.

Business Goods -- Business goods establishments sell raw materials, intermediate products, and inventories to basic industry and to personal goods establishments. It purchases these goods from the National Economy.

Business Services -- Business services establishments sell computer, accounting, insurance, legal, and related services to basic industry and to personal goods and personal services establishments. It purchases its needed goods and services from the National Economy.

Capacity Unit -- Like goods and service sectors, utility plants do not have unlimited capacity. Each land use drains a different amount of utility plant capacity, can serve a maximum of 200 capacity units.

Congestion -- Each road type has a limited capacity. When the amount of travel on a road segment exceeds its capacity, the road is congested and the cost to the traveller increases. Increased travel costs due to congestion are printed on the Highway Department output and are paid by all users of that road.

Consumption Requirements -- Every land use sector that purchases goods and services from other sectors consumes a certain amount of the capacity of the goods and services establishments. The consumption requirements are called round purchase units and are listed for each land use on the Master Information Sheet.

Cost Increment -- Both the congestion on a road segment and its value ratio affect the additional cost to travel on it. The additional cost to travel is the cost increment and is printed on the Highway Department output. Thus, if the cost increment for a road is 50, the cost to travel along that road is 150% of normal cost by type of road and type of user.

Council -- A Councilman team is elected by the majority of the residents in the Central City and in the suburbs to represent their interests. The Council votes on the Chairman's recommended tax rates and appropriations.

Depreciation -- All land developments depreciate in value as the result of age and/or use. All private land developments, school units, and municipal service units depreciate 5 percent of their present value each round. Roads depreciate in direct proportion to the number of travellers they serve.

Development -- Any private or public construction on a parcel of land is a development

Director -- The play of the game requires that a director oversee the operation; answer technical questions relating to game mechanics; apply new land use sector pieces to the board; and submit player decisions to the computer.

Federal-State Aid -- The local government departments are eligible for Federal-State aid if they make matching expenditures. The amount of aid for each department depends on the population of the county in the round.

Finance Department -- The Chairman appoints a team to act as the Finance Department, which estimates the tax bases (property, sales, income) for the round for which the Chairman is preparing a budget. The Chairman uses Finance's estimates to estimate the amount of revenue which he can allocate.

Government Departments -- The Chairman team appoints five teams to serve as its bureaucracy: School Department, Highway Department, Public Works and Safety Department, Planning and Zoning Department, and Finance Department. See each department definition for details.

Gross Income -- The gross income of basic industry is related to its value ratio and the business cycle; the gross income of a commercial sector is related to its prices, customers, location, and capacity (affected by its value ratio); the gross income of a residence unit depends on its income class, the salary paid by its employer and the availability of jobs for that income class.

Heavy Industry -- Basic Industry that has a great need to be located near a terminal because of the high cost of shipping its finished products to the national market is heavy industry. Zoning for heavy industry is usually more restrictive than for light industry because of the noise, pollution, and odor associated with heavy industrial plants.

Highway Department -- The Chairman appoints a team to build and maintain roads and build terminals. The Highway Department requests and spends funds appropriated by the Chairman and Council.

Income Class -- There are four income classes in the model: high-income, middle-income, low-income and slum. These income classes correspond to the four types of residential units and affect (1) the type of job a residence can hold (and therefore, indirectly the income earned); (2) the voting power of the residents; and (3) the expenditures for goods, services and transportation.

Interest -- Unspent team funds (cash balances) earn interest at 5% per round. Loans from the National Economy are made with an interest charge that depends upon the national business cycle at the time of the loan. Loans between teams carry the interest charge that is mutually agreed upon by the teams involved.

Investment -- Teams may invest money outside the local economy. Two types of investments exist: speculative (with 80% of the time an average rate of return of 9% and a standard deviation of 5%, and with 20% of the time an average of 0 and a standard deviation of 60%) and conservative (with an average rate of return of 6% and a standard deviation of 3%).

Land -- The Playing Board is composed of 625 squares (25 x 25), each simulating one square mile of land. Land is owned by teams, by government departments, and by the computer (representing farmers and outside interests). If land is developed in business uses, there can be only one use per parcel. If land is developed in residential uses, the parcels may be split into private and public sections. There are four types of public uses-- schools, MS units, highway rights-of-way and parkland.

Light Industry -- Basic Industry that has relatively little need to be located near a terminal because of the low cost of shipping its finished products is light industry. Zoning for light industry is usually less restrictive than for heavy industry because light industrial plants are less offensive to neighborhoods in terms of the noise, pollution, and odor generated.

Loan Payment Received -- On a team's Financial Statement, this refers only to payments received from other teams for loans granted them previously.

Loans -- Teams may arrange for loans from the National Economy at the going interest rate or from other teams at a mutually agreeable rate of interest. Teams may not incur debts beyond the allowable debt limit of 13.3% of their net worth.

Maximum Prices -- The price that local goods and services establishments can charge their customers is limited by maximum prices, which represent the price that the consumer could pay and receive these goods and services from the National Economy via mail order houses, etc. Maximum prices are listed on the Master Information Sheet.

Municipal Services -- All public goods and services with the exception of school units, utilities, roads, and parkland are grouped under the heading "municipal services." Therefore, such items as police protection, fire protection, garbage collection, hospital services, and many others are supplied by municipal service (MS) units.

All residential units must be served by an MS unit locally at a cost to the Public Works and Safety Department, which operates MS units. The design capacity is 30,000 persons per MS unit.

National Economy -- All economic interests not part of the local economy and, therefore, not controlled by the teams are referred to as the "National Economy" or "outside." Thus, required goods and services that are not purchased from local establishments must be purchased from outside. Loan arrangements not made between teams must be made between a team and the outside. Employers can hire needed workers from the outside (at twice the regular wage), but local employees cannot earn wages from outside jobs.

Natural Disaster -- Each round there is a possibility that a developed parcel of land will be damaged by fire, flood, riot, or other forms of disaster. The computer, on the basis of probability and the value ratio of developments, determines which parcels will be hit by natural disaster at the beginning of each round and the value ratio of the MS unit serving the parcel determines the extent of damage.

Net Income -- A net income is determined by taking the gross income of an owned parcel of land and subtracting transportation charges, services charges, wage costs, and taxes. Net income is always negative for undeveloped parcels of land, and may be negative for developed parcels if costs exceed income.

New Construction -- On the Financial Statement, New Construction includes funds spent on new developments, upgrading, renovation, and demolition.

Optimizer -- The assignment of workers to jobs, customers to goods and services establishments, students to school units, the population to municipal service units, and basic industry and business goods establishments to terminals is handled by the computer. The criterion used is that the assignee should pay the minimum for goods and services (when transportation charges are counted as part of the overall price) or earn the maximum income (when transportation charges are deducted from income).

Outside Economic Status Report -- A report is given near the beginning of each round's output stating the conditions which prevailed on the National Economy during the previous round. The average return on conservative and

speculative stocks, the average interest rate and the effect of the business cycle on the gross income of basic industry are given in the Outside Economic Status Report.

Outside Investment -- Teams may invest money outside the local economy in stocks. Two types of national stocks exist: speculative stocks (with 80% of the time an average rate of return of 9% and a standard deviation of 5%, and with 20% of the time an average of 0 and a deviation of 60%) and conservative stocks (with an average rate of return of 6% and a standard deviation of 3%).

Outside Service Charges -- If a commercial sector from which a development must buy is not present in the local economy or if its price plus transportation costs exceed the maximum which the development will pay, the development obtains the required goods or services from outside the local economy at the maximum charge.

Parkland -- All undeveloped municipal (city-owned) land is considered parkland and is the responsibility of Planning and Zoning. If a school or municipal service unit is built on it, the land ceases to be parkland. Parkland may exist only on undeveloped or residential parcels.

Personal Goods -- All residential units must purchase a certain amount of personal goods (food, drugs, appliances, etc.,) in every round. These goods are purchased from a local personal goods establishment if the price charged plus transportation cost is less than the maximum price, the price at which the goods can be bought from the National Economy.

Planning and Zoning Department -- Planning and Zoning is appointed by the Chairman to provide parkland and establish zoning regulations for the county. It requests and spends funds for parkland appropriated by the Chairman and Council.

Playing Board -- Land holdings, private developments, and public facilities are represented by symbols on a board or page of computer output, which simulates 625 square miles of land. On the board team ownership is shown by letters and public and private developments are shown by symbols.

Population -- The population per R1 varies according to income class. An RC1 has 3,800 people; an RB1, 3,400 people; and an RA1 and RS1, 2,300 people.

Public Works and Safety Department -- Appointed by the Chairman this department is responsible for municipal and utility services. Public Works and Safety requests and spends funds for building and maintaining MS units, hiring employees for MS, building utility plants, and installing utility service.

Renovation -- Renovation is the repair and maintenance of land developments. Teams may increase the value ratio of their developments by renovating. Residential class cannot be upgraded via renovation. The cost of renovation = (proposed value ratio - present value ratio) x original cost of development. Since the value ratio decreases by 5% every round, if a team wishes to maintain a value ratio of 100, it must use 105 as the proposed value ratio.

Residential Units -- Residences are the non-business private developments in the model. Three types of residential units (high, middle, and low-income) may be developed and a fourth (slum) may be generated during play through depreciation of low-income residences. A parcel of land may be developed to a maximum density of RC5, RB6, or RA8.

Roads -- There are three types of roads which can be developed, representing different levels of capacity and transportation charges. The Type III road has a capacity that is one-third and a cost factor of transportation that is three times that of the Type I road. The Type II road has one-half the capacity and twice the use-cost factor of the Type I road. Roads are constructed, upgraded, and maintained by the Highway Department.

Round -- A round is a cycle of play that represents an election period and a calendar year of business activity. During a round (approximately two hours) elections take place; incomes are earned; taxes are paid, budgets are drawn up and approved; funds are appropriated and spent; land may be bought and developed; and computer output is generated, showing the interaction and outcome of team decisions.

Round Purchase Units -- A measure of the consumption requirements of land use sectors. The number of round purchase units consumed by each land use in every round is listed in the Master Information Sheet. The capacity of commercial sectors is stated in terms of RPU's.

Service Charges -- Each development purchases goods and services. The sector type from which each land use buys, the maximum which it will pay (price at the sector plus transportation charges) and the cost to travel to each sector are given on the Master Information Sheet. A development buys from the cheapest sector (price plus transportation). If the best sector is at capacity, the development shops at the next cheapest, and so on. If the total cost to the cheapest available sector exceeds the maximum, the development buys from the National Economy, paying the maximum price. Business Goods purchase their goods and services from the National Economy. Their costs are a function of the number of RPU's they serve. School costs are included in service charges for residence units.

Slum Property -- Slums are low-income residence units which have depreciated to a value ratio below .50. Such units then have a value ratio of 1.00. The residents of slum housing are the last to be employed in low-income jobs.

Students -- Although each residence unit has 1000 workers, the number of school-age residents is different for each income-class. Low-income has 690 students per 1000 workers; middle-income, 850; high-income, 760. Students are assigned to the closest school unit with satisfactory conditions and sufficient capacity.

Socio-Economic Parameters -- These are listed at the end of an output, reflecting such local conditions as the unemployment rate and the quality of schools and municipal services.

Subsidies -- Public authorities may wish to subsidize private teams in order to provide low-income housing, provide unemployment compensation, etc. Subsidies are approved by the Chairman and are granted through the Planning and Zoning appropriations.

Taxes -- Three types of taxes are possible in the county -- property, sales, and net income. Teams may pay property tax on the assessed value of the parcels of land their own. Owners of developments pay property tax on the original value of the development and net income taxes on positive net incomes, and owners of residences pay personal goods taxes on the amount of such goods purchased. Tax rates are set by the Chairman and approved by the Council.

Teams -- Nine teams participate in the play of the model. Each team has from three to five members and is distinguished by a letter (A through I). Each team performs an economic function each round as an entrepreneurial decision-maker. Each team also performs a governmental function each round based upon the office it holds for that round.

Terminal -- A terminal is a point on the playing board from which basic industries output is shipped to the national markets and from which business goods establishments receive goods from the National Economy. Terminals can be any of three capacity levels and are located at the intersection of roads. The Highway Department constructs and upgrades terminals. Low level terminals may serve only low level industries.

Transportation Charges -- Travel along roads involves a cost to the traveller that is dependent on the number of miles traveled, the type of roads used, and the total cost increment along the road (in the case of travel to work). All transportation charges are paid to the National Economy representing national automobile manufacturers, nationally operated service stations, and a local public bus system controlled by a company outside the local economy.

Upgrading -- Each parcel may contain several possible densities of whatever development exists there. Increasing the density is called upgrading.

Utilities -- Before a parcel of land can be developed by its owner, it must be serviced with public utilities, which represent water, sewerage, gas, and electric service. Utility service is provided to parcels of land by the Public Works and Safety Department and is assigned to a utility plant. Each type and level of land use consumes a certain amount of utility service, which affects the overall cost of operating the utility plant(s) from which the service emanates.

Value Ratio -- The ratio of the present value of a development to the original value. This ratio decreases with time if no renovation takes place, because the present value of a development decreases 5% of its current value each round. The value ratio affects the probability of damage from natural disaster for all developments; the gross income received by basic industry; the capacity of commercial sectors; the deterioration of residential units

to lower income classifications and the level of protection provided by an MS unit to residential units in the case of natural disaster.

Wage Costs -- All businesses offer wages to low, middle, and high income workers. Each residence unit, housing 1000 workers who are employed as a group, chooses the job which offers the highest net return (wages minus transportation costs). If the best job is already filled, the residence takes the next-best job, and so on. A business is always fully-staffed. However, if there is a shortage of local workers in the labor market, a business may be hiring employees from outside the local area. Wages to such employees are double the wage offered in the county for that class. Each business must hire the number of employees specified for its type and density on the Master Information Sheet.

Zoning -- Parcels of land may be zoned or rezoned by the Planning and Zoning Department. The zoning classifications are listed on the Master Information Sheet, and they indicate the type and in some cases, the density of development that is allowed. Unless the Council adopts a new comprehensive zoning plan, only five zoning changes may be made in each round, and these may be appealed by the teams.

C. Master Sheets

ECONOMIC SECTOR MASTER SHEETS

Land Use Sector	Construction Costs	Employees			Requirement for Normal Operations: Consumed and Maximum Total Price			RPU's
		H	M	L	BG	BS	PG	
Heavy Industry								
HI1	\$100,000	1	1	1	6 (\$21,000)	6 (\$10,000)	--	--
HI2	150,000	1	2	3	10 (\$34,000)	10 (\$16,000)	--	--
HI3	200,000	2	3	4	14 (\$56,000)	14 (\$26,000)	--	--
Light Industry								
LI1	120,000	1	1	0	8 (\$30,000)	8 (\$13,000)	--	--
LI2	175,000	1	2	1	12 (\$46,000)	12 (\$20,000)	--	--
LI3	200,000	2	3	1	14 (\$56,000)	14 (\$23,000)	--	--
Business Goods								
BG1	150,000	1	1	1	\$1500 x #RPU's sold ¹		--	--
BG2	175,000	1	2	1	\$1500 x #RPU's sold ¹		--	--
BG3	200,000	1	2	2	\$2000 + 1500 x #RPU's sold ¹		--	--
Business Services								
BS1	150,000	2	0	0	\$400 x #RPU's sold ¹		--	--
BS2	175,000	2	1	0	\$400 x #RPU's sold ¹		--	--
BS3	200,000	2	1	1	\$3000 + \$400 x #RPU's sold ¹		--	--
Personal Goods								
PG1	50,000	1	1	2	2 (\$6000)	2 (\$4000)	--	--
PG2	75,000	1	2	2	3 (10000)	3 (\$5000)	--	--
PG3	100,000	1	2	3	4 (13000)	4 (\$6000)	--	--
Personal Services								
PS1	30,000	1	0	0	---	2 (\$4000)	--	--
PS2	45,000	1	1	0	---	2 (\$4000)	--	--
PS3	60,000	1	1	1	---	2 (\$4000)	--	--

Economic Sector Master Sheets (Continued)

Land Use Sector	Construction Costs	Workers Supplied			Requirement for Normal Operations: RPU's			
		H	M	L	Consumed and BG	BS	PG	PS
RC1	\$30,000 ²	1	-	-	--	--	2 (\$3580)2	2 (\$1890)2
RB1	15,000 ²	-	1	-	--	--	2 (\$1970)2	2 (\$880)2
RA1	7,500 ²	-	-	1	--	--	1 (\$1070)2	1 (\$450)2
RS1	--	-	-	1	--	--	1 (\$1070)2	1 (\$450)2

Land Use Sector	Design Capacity (RPU's) When Value		Transportation Charges to: ³					Gross Income Per Round
	Ratio = 1.00		Terminal	Work	BG	BS	PG	
HI1	--	--	\$2000	--	500	200	--	(normal)
HI2	--	--	3000	--	750	300	--	70,000
HI3	--	--	4000	--	1000	400	--	112,000
LI1	--	--	500	--	500	50	--	173,000
LI2	--	--	1000	--	750	80	--	83,000
LI3	--	--	1500	--	1000	100	--	129,000
BG1	29	--	500	--	--	--	--	162,000
BG2	43	--	1000	--	--	--	--	Varies According to number of RPU's sold
BG3	64	--	1500	--	--	--	--	
BS1	52	--	--	--	--	--	--	
BS2	69	--	--	--	--	--	--	
BS3	80	--	--	--	--	--	--	
PG1	45	--	--	--	150	100	--	
PG2	64	--	--	--	200	100	--	
PG3	77	--	--	--	250	100	--	
PS1	51	--	--	--	--	100	--	
PS2	74	--	--	--	--	100	--	
PS3	90	--	--	--	--	100	--	
RC	--	--	--	130 ²	--	--	100 2	70 2
RB	--	--	--	90 ²	--	--	60 2	40 2
RA	--	--	--	302	--	--	20 2	10 2
RS	--	--	--	30 ²	--	--	20 2	20 2
								10,000 2
								5,000 2
								2,500 2
								2,500 2

Economic Sector Master Sheets (Continued)

NOTES:

1. BG and BS purchase goods and services from the Outside at fixed costs.
2. Costs, requirements, etc., for residences are multiples of the development level. For example, an RB1 costs 15,000 to build, supplies 1 middle income worker for the labor force and purchases one RPU of PG at a maximum cost of \$1,070. An RB3 costs \$45,000 to build, supplies 3 middle income workers and purchases 3 RPU's of PG at a maximum cost of 3210.
3. All transportation costs are per mile on a Type I road. Costs are double on a Type II road and triple on a Type III road.

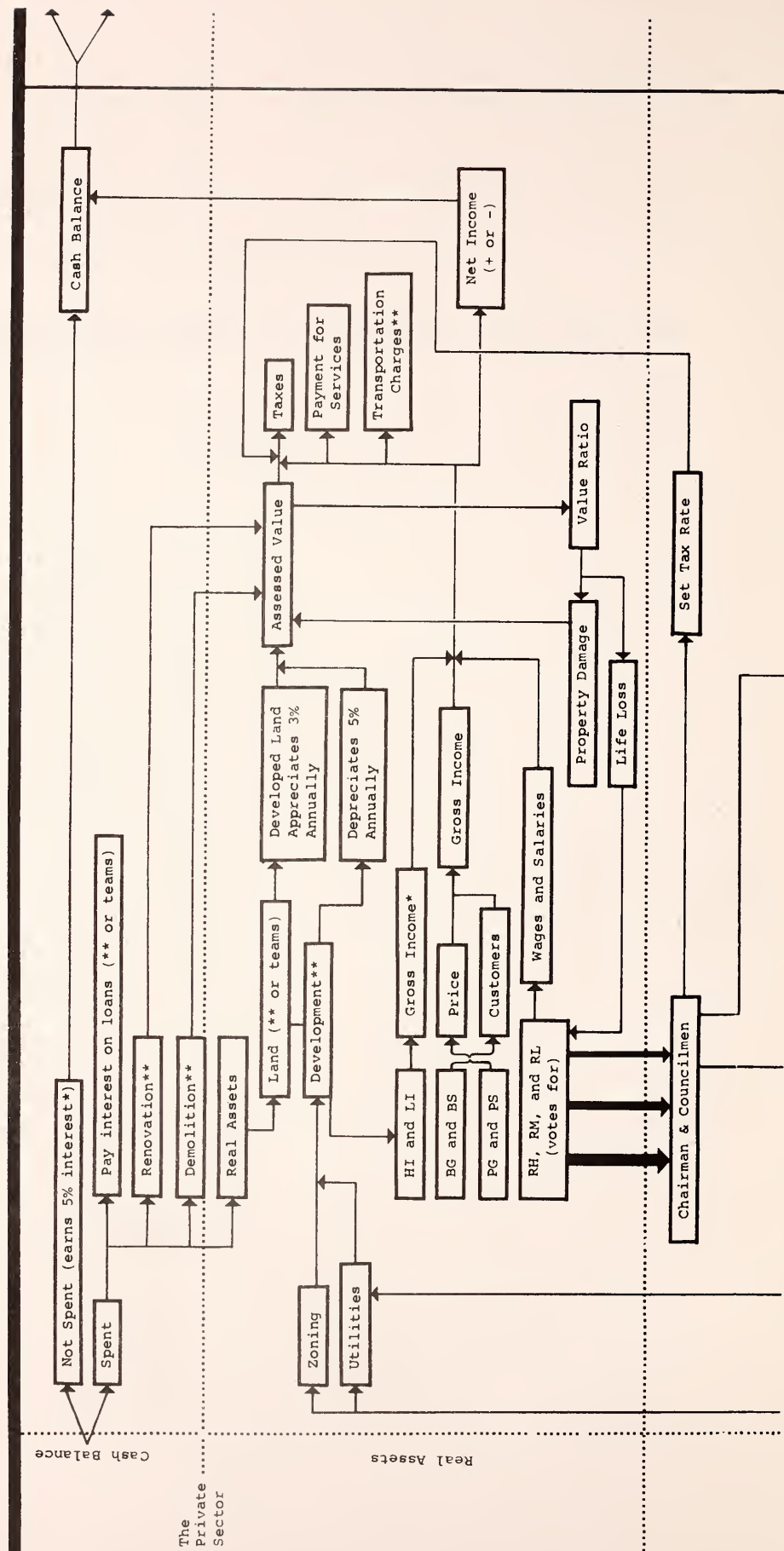
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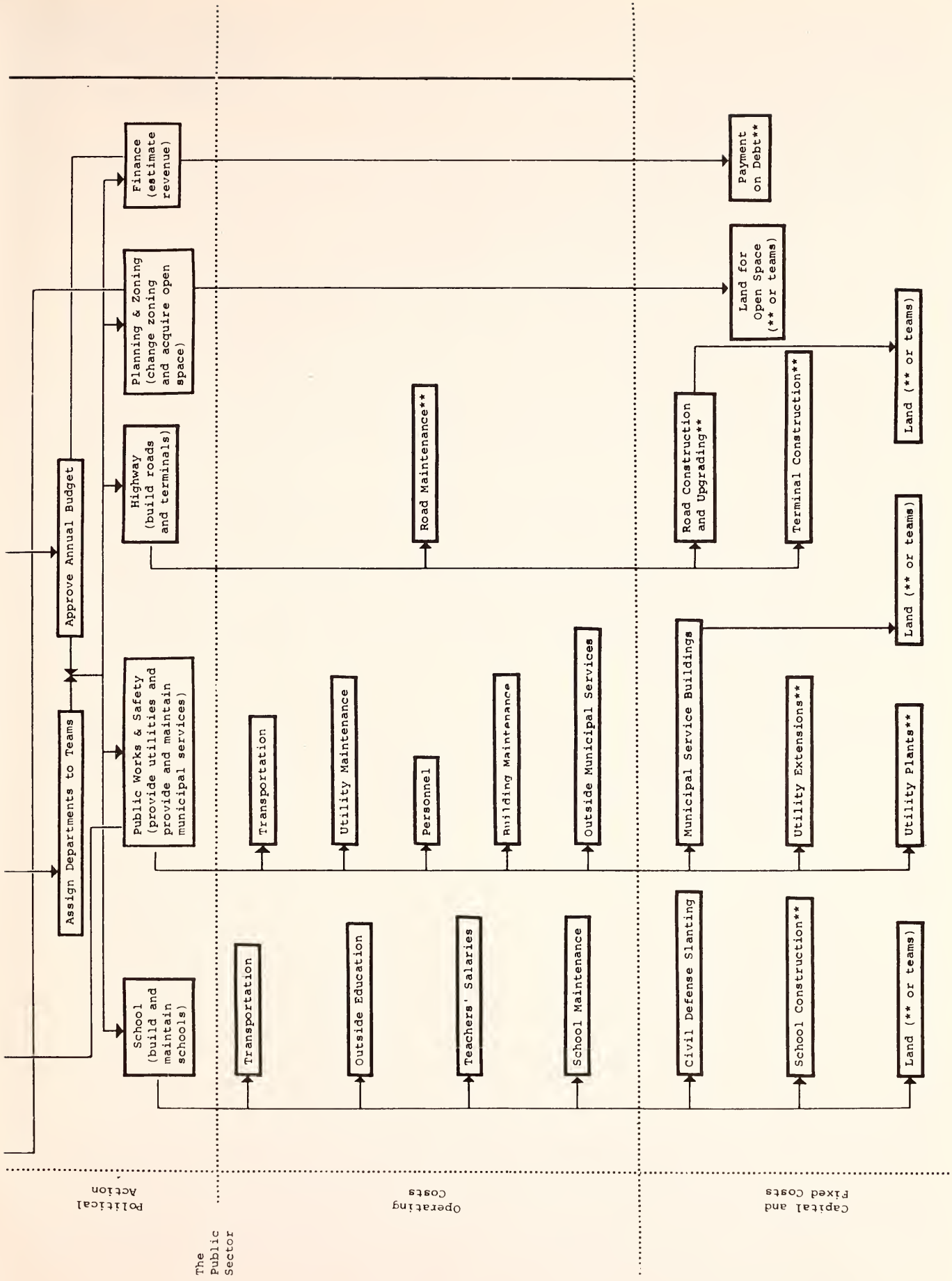
The Flow and Interaction of Private and Public Functions in

CITY I

C. The Flow and Interactions of Private and Public Functions in CITY I

- * Payment from the National Economy
- ** Payment to the National Economy





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